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AVIATION

The Oldest American Aeronautical Magazine



THE *Western Show and Airport Conference*

BALANCING *Weight and Costs in Materials*

THE *Hall Shipboard Fighter*





The "Corsair"...the eyes of the Navy



The "Corsair" with its 425 H.P. "Wasp" engine adapted to a high performance completion for the aircraft carriers of the Navy.

MODERN problems in naval gunfire involve tremendous ranges. As the standardized observation plane of the Navy the "Corsair" has enabled spotters to increase their vision far beyond that afforded from the "taps." It has proved its worth with thousands of hours of satisfactory service.

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from a battleship catapult, landed on the deck of a carrier, on the sea or at a shore station.

The system set up by catapult launching and quick stopping aboard a carrier require safety factors far in excess of those used on any other type of ship. When the "Corsair" goes into civil life for sports or business use it provides the same margins of performance and dependability which characterize its naval and military operation.

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Long Island City, New York

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A FUTURE
"Capitol of Aeronautics"
IN THE MAKING

EVERY BRANCH of aeronautics is provided for in the plans for the new Glenn L. Martin airport and plant now taking form at Middle River, on the outskirts of Baltimore. There will be laboratories for the engineer, shops for the artisan, a school for the student with courses covering both design and flying, a residence colony with hydroplane landing for the amateur, and a hotel, restaurant and camp for interested visitors.

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Builder of Quality Aircraft since 1917
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It's
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ELIMINATE foamy lubrication
and you do away with an
important cause of engine failure.
On many miles of streams TP-
Aero Motor Lubricating Oil keeps
the engines running smoothly—
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This process has secured ad-
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removes all the paraffin wax,
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this means uniform viscosity at all
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that does not dilute or

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at low temperatures.

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TP-Aero
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Aero
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TEXAS PACIFIC COAL AND OIL COMPANY
FORT WORTH, TEXAS
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three vital factors in *Du Pont Aircraft Finishes lend im- estimable aid in airplane styling*

NO longer can the aircraft maker depend exclusively on mechanical appearance for competitive sales success. As aeronautics progress, all planes—all models—approach each other, more and more closely, in structural perfection. Today, style plays a leading part in aircraft merchandising.

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On-Paint Finishes—The du Pont line of aircraft lacquers, materials and colors, reflect many years of practical experience. They are all tested formulas of remarkable durability in service as well as in the laboratory. Products of the du Pont Company, Army and Navy have approved these products for their requirements. Available in a wide variety of highly visible colors.

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DuPont Pyralin and Fabrikoid adapt themselves to countless aircraft luxuries and refinements

In the styling of modern planes, DuPont Pyralin and Fabrikoid offer almost unlimited possibilities. Extremely light, ideally durable, and beautiful in the most modern sense, these materials fulfill every requirement of air service.

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windows, instrument boards and wing lights of smart appearance and unsurpassed serviceability. Complete information and every general use will be furnished on request.

Fabrikoid completely eliminates cabin linings and upholstery. Its lightness and toughness make it highly practical for the air



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Die-Paint Fibreboards—Die-Paint Fibreboard is an ideal material for airplane interior upholstery. Both DuPont Rayon and DuPont Acetate Fibres are new-type, light-weight materials designed for interior uses of all sorts. Made in a high grade woven fabric, they are ideal insulation, especially protective colors, disclosed in literature.

Die-Paint Pyralin—Strong, durable, light, waterproof, transparent material useful in any aircraft interior. It is especially appropriate for window frames. Made from cellulose acetate, running lights and interior

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TRIED the OTHERS

Now uses Socony



"WE have tried numerous aviation gasoline and oils," said Roy Aleem, chief pilot of the Red Wing Flying Service, Inc., of Ware, Mass., "but we have always come back to Socony products. Our advance purchasing man has orders to buy only Socony in New York and New England."

This is the opinion of a crack pilot who has had more than four thousand hours of flying to his credit, and is a member of the famous Caterpillar Club.

Before using Socony Aircraft Oil, Aleem put it to a severe test. The plane was flown for twenty hours with an average of five minutes to the flight. This continual opening and closing of the motor is usually severe on oil. At the completion of the long day's grind, a check showed that only two quarts of oil were used, and the remainder was in excellent condition.

You too will find that Socony aviation products will withstand the severest tests a plane gives them.

S O C O N Y

AVIATION GASOLINE

AIRCRAFT OIL

STANDARD OIL COMPANY OF NEW YORK

B ohnalite castings guard Axelson quality



The quality of precision castings in Axelson Engines is so lasting that the first workmanship is used exclusively. It was chosen by Axelson engineers after exhaustive tests. Bohnalite is a high temperature metal which withstands extreme temperatures that subjected to a greater load and presents a metal assembly that will not deteriorate when the engine is subjected to such tests. The engine work excluded sand casting because of the difficulty of getting a uniform casting. When the temperature is reduced to a minimum without sacrifice of durability Approved Type Certificates No. 16 U. S. Department of Commerce.

Axelson Aircraft Engine Co.

Padre and Sepulveda Ave., Los Angeles, California
(P. O. Box 325)

AXELSON
Airplane Engines



Bates paid me the finest compliment I've ever had

Bates flies because he's keen about it, and because it saves him good business days every month. When he asked me to go to Boston with him in his Sikorsky Amphibion I broke three dates to do it.

We slid into one of the most comfortable pilot's cockpits I've ever sat in. Roomy. And you can adjust the seat to suit yourself. The engines were warm and Bates picked her off the water with scarcely any run at all. I noticed she climbed fast, and very easily. Bates circled the bay and put her on her course.

And then . . .



He passed me the wheel of his Sikorsky Amphibion

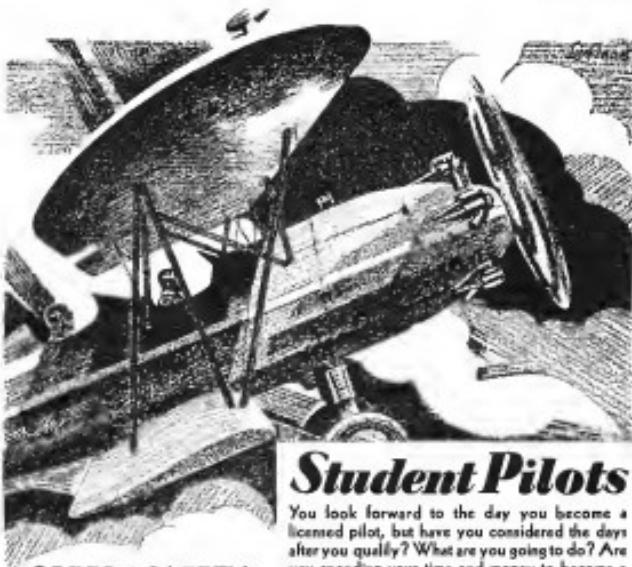
Bates glanced at me and swung the control wheel over into my hands.

I seldom fly large ships, and I thought of the "S-38" as something a bit difficult to handle. I got the surprise of my life. She controls easily and naturally and is absolutely alive with reserve capacity to do all you ask of her. When I set her down in Boston Harbor, Bates smiled approvingly.

You can guess how much Bates thinks of that ship. She'll do more than 125 miles an hour, climb to 18,000 feet, and fly and maneuver on either engine. His passing over the controls was the finest compliment I've ever had.

**SIKORSKY
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Bridgeport, Connecticut

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SPEED + SAFETY

Ever since the first Brünnner-Winkle Bird took the air it has held the standard for performance with safety.

In internal construction, in wing design, in inherent stability—every item of its design and assembly has lifted this plane to its superior position in the popular priced class.

And now, the NEW Bird, powered by Kinner R-6-H.P. (Approved Certificate No. 599), will win even higher honors for its ECONOMY with SAFETY and PERFORMANCE!

BRÜNNER-WINKLE AIRCRAFT CORPORATION

17 Haverkamp St., Brooklyn, N. Y.

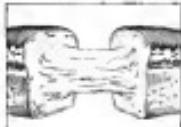


Safety Performance

Cords that are *Stretch Matched* and Rubber that is "Water Cured"



A MORE STRETCH-MATCHED
tire gives greater safety and performance.
It stretches and relaxes more uniformly
and much more needed strength and resilience.
They give Goodrich Tires a
margin of safety and performance.



THE WATER CURED principle of
slow baking, as applied to tires,
would have presented the major
problem in tires. Goodrich
Cord Tires are made entirely off the
cord through, insuring uniform
strength and elasticity at every point.



GOODRICH SPLIT-SECOND SILVERTOWNS

UNIQUELY the tire on an aeroplane,
the airplane tire is an integral
part of the plane.

Passing an automobile tire and
you can control it with the steering
wheel. But here an airplane tire and
over goes the plane.

Strength in airplane tire construction,
therefore, is vitally important.

Goodrich has attained strength without
compromising lightness of the tire and
the plane's speed, by combining the stretch-matched cord
construction with the
Elasticite Goodrich
"water cured" rubber
strengthening process.

Every Goodrich air
plane tire, therefore,
is tough right down.



GOODRICH TIRES are
light of weight yet strong
enough of construction to
withstand take-off and
landings in the most hazardous
fields.

GIRD YOUR GOODRICH
NON-SKID surfaces are
designed to grip firmly and
longer than ordinary tires
to enable pilots to take off on a
water-saturated field without any
unnecessary reduction in
flying speed.

Goodrich
• G •

**Rubber for
Aviation**

so the innermost ply. On the landing
gear of airplanes they make take-offs
quicker, the planes swifter and landings
safer.

No mere claims need be made for
Goodrich Split-Second Silvertowns...
would words have proved them?

The B.F. Goodrich Rubber Company,
Established 1910, Akron, Ohio. Pacific
Goodrich Rubber Company, Los
Angeles, Calif. In Canada: Canadian
Goodrich Company, Kitchener, Ont.

Pre-Inventory Sale

Special low prices on quality items in order to reduce stock before inventory taking time. All prices good only until January 1st.



Helmets
Chocolate Colored Caps
Black or Red Linings

A superior helmet with fine leather headband and chin strap. It has leather padding on the headband and chin strap, and leather straps to hold the goggles. The goggles are made of clear plastic and have leather straps to hold them. The helmet is made of leather and has a leather chin strap. The goggles are made of clear plastic and have leather straps to hold them. The helmet is made of leather and has a leather chin strap.

\$4.00

26x4 Wheels—New (Clincher).....	\$11.50
26x4 Wheels—Reconditioned (Clincher).....	7.00
5/8-inch Shock Cord (New) per foot.....	.25
3, 5-inch Shock Cord (New) per foot.....	.15
OX-5 Exhaust Manifolds, per pair.....	6.50
OX-5 Exhaust Elbows, each.....	1.00
Fahrenheit Gauges.....	3.00
Oil Pressure Gauges—Plain.....	1.00
Oil Pressure Gauges—Luminous.....	2.00
R-W Long Safety Belts—New Style, 3-inch wide, Gray.....	3.50
R-W Short Safety Belts—New Style, 3-inch wide, Gray.....	3.25
Zenith Altimeters.....	9.00

All new merchandise in perfect condition
and at prices far lower than any other
quotation you have received. Every
item is standard and first quality—every
one a bargain.

Used Propellers At Less Than Half Price

All of the propellers listed below have been used
but just a few hours. Each is in fine condition
and represents an attractive bargain. The low
prices are intended for quick removal.

Hartzell Propeller (2) (Used) Curtiss Robin CX-5.....	\$40.00
Hartzell Propeller (2) (Used) Travel Air CX-5.....	48.00
Hawthorn Propeller (2) (Used) Travel Air CX-5 with hub.....	45.00
Hartzell Propeller (2) (Used) Waco 10 with hub.....	48.00
Curtiss-Rudd Propeller (1) (Used) CX-5.....	100.00
Mesport-Solis (Model A) Propeller, Used.....	50.00

Prompt Reliable Service on All Supplies

Complete stock of all kinds of aircraft supplies and aircraft shop equipment. Many items fully guaranteed to meet A.M.A. specifications or stand up to commercial acceptance. Prices are considerably lower because of our large quantity purchases. Write for catalog to Dept. W.



Flare Gun Mittens
Four Quarters Buckle
Made of soft leather. These flare gun mittens are only leather, lined with either heavy and warm fur or with a soft, light, and warm lining material. The lining material is a dense woven fabric, very soft, warm, and easily快感. Made of leather and easily快感.

\$4.00 Pair

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E M S C O
A COMPLETE LINE OF AIRCRAFT FOR LAND AND SEA



The Enco Standard
monoplane is built
of wood and fabric.
It has a top speed
of 120 miles per
hour and a landing
speed of 40 miles per
hour.



The Enco Standard
biplane is built
of wood and fabric.
It has a top speed
of 120 miles per
hour and a landing
speed of 40 miles per
hour.



The Enco
monoplane
is built
of wood and
fabric. It
has a top
speed of
120 miles
per hour
and a
landing
speed of
40 miles
per hour.

EACH A LEADER IN ITS CLASS

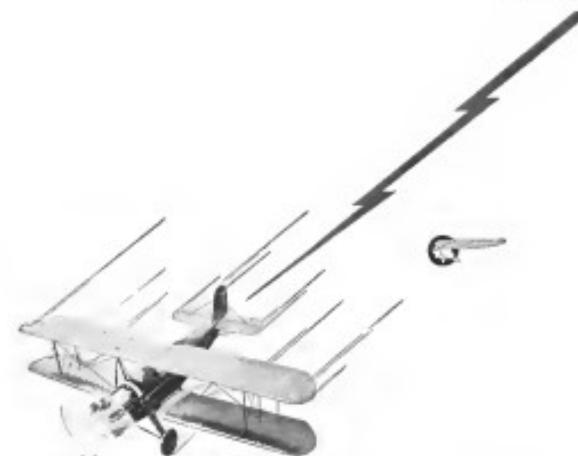
Embossed on metal plates that have been popular by parts of aircraft in commercial and military service—both by major aircraft manufacturers—such as the Boeing Company is a new \$1,000,000 factory equipped with the most modern approved production methods. These three types of Enco Aircraft are proving every day their superiority in providing safe air transportation with greatest economy.

The Enco Cirrus has four seats easily under normal flying conditions with a fuel consumption of only 40 gallons per hour at cruising speed. With the B-12, powered with a 300 h.p. Wright Whirlwind engine, it can take off from a level ground in only 10,000 pounds with a run of a half mile. The Enco Challenger has demonstrated its dependability, safety and economy by flying

more than 65,000 miles under all conditions, within the last four months.

The Enco Aircraft Corporation is the most recent addition to the aircraft industry of America. It was founded in 1937 and is a company whose members are among the best in the business. It has plants in Los Angeles, Calif., and Dallas and Houston, Tex. The same sound business principles that have made the name EMSCO so distinguished and productive, is now being applied to aircraft, a permanent and important industry, in the production of the new aircraft which is not a logical and forward step in the remodeling of the new industry which is not a logical and forward step in the remodeling of the new industry.

All Enco lead planes are delivered from the factory with factory fittings so that no standard changes are necessary to quickly adapt them to regular work. The B-12 may easily be transformed into a 10-passenger plane or biplane for medical use or similar. Allowing the plane to stand. Complete specifications, performance data and price will be furnished on request.



NEVER A BREACH OF FAITH

Spartan believes that in the manufacture of airplanes any sacrifice of perfection to haste is a breach of faith with some pilot. As a result every Spartan reaches its owner flawless in material, perfect in workmanship and rigorously tested.

The world's finest products are painstakingly made by hand, because skilled human touch is essential to the finer product. Perfect workmanship is one of those Spartan standards which will remain consistently inflexible through the years, making exacting demands on the Spartan organization . . . in engineering, in construction and in the performance of Spartan airplanes.

See Notes for description of model and photograph of the Spartan C-24M, powered by the Wright Whirlwind engine . . . Approved Type Certificate Number 152.

SPARTAN AIRCRAFT COMPANY
TULSA . . . OKLAHOMA

AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A MONTHLY PUBLICATION — ESTABLISHED 1910

EDWARD F. WARNER, Editor

November 20, 1929 . . . 

Rate-Cutting on Air Lines

AS HENRY FORD observed in the earliest days of automobile building, there are two ways of making a business self-supporting. One may have a small trade at a high price, necessary to absorb large overhead and generally high unit costs resulting from meager production, or do a vast business at prices reduced to keep pace with the economies of mass production. There need not even be a difference in the quality of the article produced under the two alternative systems, unless the low price trade itself governs by competition. If Mr. Ford were now the only maker of automobiles, and able to disregard everyone except his customers, he might either hold his present car in the present quantities, or turn out one-to-one thousandth as many of the same model, still there at a price many times higher, and save a net profit not much higher than under present conditions and infinitely smaller total profit.

So with air transport. It can be run small or wholesale. If a complete general organization and mechanical staff had to be kept up to provide one round trip a week over a long route, it might be necessary to charge 25 cents a passenger mile to make both ends meet. Make the service a daily one, and net costs come down. Schedule hourly departures and they drop again. We have so far been on the retail side. To get away from it, and to increase the volume of operation so that the major elements of cost may be lightened, concentrate the major elements of air transport operation.

Taking it for granted that air lines in the United States will receive no direct subsidy, operators have only two alternatives. In one case can it be expected that traffic volume will develop instantaneously; however low the rates might be set and however many planes might be put into the service. It takes time for the existence of a new medium of transport to sink into the public consciousness, so that its use becomes normal and automatic. A new habit has to be established. To the manufacturer, the rates upon air lines may either be set so

high that they will show a profit from the start, with the expectation of a gradual reduction as traffic on the line increases, or they may be suddenly slashed to start with, with deliberate intention to an operating loss until such time as the public may have become accustomed to using the line. The first option is less prodigal of the company's resources during the development period, but the second gets quicker results.

Theoretically, there is a free choice between the two courses. Actually, it is doubtful if the first could be financially carried out except on a few especially favored routes. Only where existing means of transport are immediately slow or inefficient is there such a compelling demand for the service of an air line as to enable one to cover operating expenses from the very first—but that financial disability it shares with every nearly every other service in transportation that has been introduced in modern times.

The question is then rather one of how rapid a drain upon capital can be made. The lower the ratio, the sooner we shall have a half-a-billion passenger miles a year of traffic instead of one-one-hundredths of that amount. The cutting of rates wherever a substantial operating loss can be accepted, and whether or not competition is a factor, is step forward and brings the time of really profitable operation nearer. To justify economically the idea that some of the lines are charging now, they would have to increase their volume of traffic at least fourfold, and then perhaps four times again on top of that—but they have made it reasonably possible for the public to ride in air lines twice the present numbers, and they have only to wait for a realization of that fact to sink in. Fortunately most of the transport companies have enough revenue of capital to carry the load. We currently hope that they will all adhere, even more definitely than in the past, to the policy of fixing rates at which there is a large potential demand and then looking forward to rapid and continuous expansion of the volume of their service in

performance to trying to buying rates, demand, and operating costs into amorphous equilibrium.

In the meantime, it is particularly important that the government's air mail compensation policy should remain reasonably liberal so to help carry over this critical transition period of sterilization of new business.



Wanted, Courage!

WE WITH his constituency silent for going to the heart of any matter, President Hoover has attacked at the fundamental cause of business depressions, and especially in the threat to business stability that was manifested in the recent stock market debacle. While there has been no specific mention of the aircraft industry in his calls of conference of industrial leaders, his action has a definite lesson for the manufacturers and operators of aircraft. They should redouble their efforts and shape their courses accordingly.

There are several different kinds of business depressions, and economists provide even more different kinds of explanations, but in most cases they resolve themselves into the cumulative results of wide-spread anxiety. Let a sufficient number of stockholders become frightened at the same time, and they will shun their securities upon the market at current prices, entirely without relation to the value of the property that they represent. Certainly, it may be observed that it is equally possible for a large body of speculators to step themselves and each other up into an enthusiasm producing equally absurd results on prints at the other extreme.

What is most pitifully apparent in the stock exchange is not confined to that reflected here. Exactly the same psychology operates upon automobile manufacturing, transportation, and other business enterprises. Let the holder of any product suspect that business is to be bad, and he sees dollars leaving production and buys off employees. With their buying power restricted, those who have had them as consumers are obliged to reduce to two. The cumulative process of reduction gathers momentum like the proverbial snowball, and the final result will have made them a fact.

What any industry needs at such a time, and what the aircraft industry particularly needs at this time, is a definite display of courage and confidence at high places, such as has been offered by the assurance given by cultural executives after their conference at the White House that there would be no contraction in their plans for the future.

The producers of aircraft must be sensible, and it must be matched up with current markets. When selling activity slows down, production is bound to do likewise, but there is no excuse for any company on a sound footing slowing down its effort to find markets

The aircraft industry, like every other, is going to have its occasional losses and declines, let the general trend now be steadily forward. Companies that expect to be in business ten years from now will have to keep pushing forward steadily. To hold water because of a temporary recession in the stock market, or to stop trying to sell surplus, because sales have fallen off, is as unreasonable as a child's fear of the dark. A great French general once summed up the whole art of war in the vigorous aphorism "L'audace, l'audace, toujours l'audace," which was freely translated in a Broadway pamphlet of a few years ago: "Never, never, and then a little more, never." The motto is an excellent one for all business in time of threatened subsidence, and if it is widely enough adopted business depressions will be few and far between. It is a particularly sound precept for the aircraft industry for the year to come.



Seeing Football from the Air

IT MAY BE a little late to comment upon the selection of officials in the football season, but the Department of Commerce has given us the excuse. Mr. Baldwin's warning to place the rules that they are supposed to follow when in the neighborhood of a stadium deserves closest attention. It should be borne in mind during the "intersections" games which will dot the southern part of the country for the next month. It should register clearly enough upon every pilot's consciousness so that it will not be necessary to repeat it next year.

While the seeing of a football game from directly above and from a low altitude has the charm of novelty, no way has yet been discovered of ensuring that point of vantage without serious encumbrances upon the rights of the spectators in the stands. Even though the airplane never gets into such a position that there would be actual danger in case of engine failure, the ordinary spectator is not an aerialman expert, and cannot be expected accurately to measure probable gliding angles with his eye. He knows only that he is being seriously disturbed, and that if the plane should "fall" a hypothetical danger that the average charmer is not yet able to put entirely out of his mind, he or his neighbors would be in a very unhappy position. Furthermore, he has come to his seat in the stand for a definite purpose and he wants neither noise nor motion disturbance than on the field to distract his attention. While it would, of course, be impossible to operate airplanes at all if every fear or prejudice of any group of non-fliers had to be taken in imposing a commandos, those who care for a sporting spectacle are entitled to enjoy it free of any disturbance of mind, body, or nervous system.

Newspapers want to show their readers a birdseye view of the field and the crowd, and it would be a pity from all points of view too delay them the opportunity entirely. In any case, the legitimate operations of regular aerial photographers are unlikely to make trouble, for they know what they are about, and they get it with a minimum of wasted time and usually without any occasion to fly close to the ground. There should be some check even upon photographic flying, but it need not be by any means eliminated.

The greatest problem are the private flyer or professional pilot out to satisfy his own curiosity, and the navigator of the flying billboard. While we would be the last to suggest any check upon advertising inflation, we do heartily condemn any operation of planes bearing advertising signs back and forth above a stadium with the deliberate intention of compelling the regard of the audience. It inevitably leads to annoyance, if not to dangerously low flying. The regulations of the Department of Commerce are properly strict upon this subject of flying over crowds. It is not sufficient merely to stay at a height permitting a glide to a safe landing place. We profoundly hope that every pilot will feel an obligation to drop even more rapidly and soaring than the Department's rulings require, an obligation best fulfilled by giving the football field a wide berth except when definite business requires passing through its neighborhood at an angle alternate and for a limited time.



The Road Over the Atlantic

THIRTY MONTHS have passed since Lindbergh's momentous hop, and the transatlantic glamour has been popular that regular commercial airplane service would be established in the immediate future have had time to cool. Trans-Atlantic commercial flying continues the object of serious aspiration but its nature has changed. For the most part now, and should remain, an intelligent venture which takes account of the limitations and the difficulties and which resists the temptation to rush into print with spectacular projects based both technically and economically.

Looking at the matter quite cold-bloodedly, the fact is that there is no airplane now in existence, nor as far as can be definitely known in early prospect, which is capable of traveling non-stop for over two thousand miles with reasonable economy and with a reasonable margin of safety for adverse weather conditions. As a matter of fact, in setting the figure at two thousand miles we are trying to be extremely generous. It would hardly be safe to plan as going beyond forty per cent of that mileage for a regular service over either land or sea. Regular New York-Paris service without any inter-

mediate stop is for the present, and so far as we can see for some time to come, utterly out of the question. The formulation of projects for any such service prior to the arrival and conclusive demonstration of aircraft with performances distinctly superior to any now available is a waste of time which could be better employed elsewhere.

Leaving aside this pleasing but for the present unattainable goal, there is still a number of ways of establishing an Atlantic air service. There is the South Atlantic, favored by the French and Germans, but of limited direct interest to North Americans. In our own latitudes there are the continental coastal shipping routes affected by the Azores and the Bermudas group. Turning farther to the north, the heading of the journey at Greenland and Iceland comes in for notice, and the straight jump between Newfoundland and Ireland is at least worthy of theoretical consideration, although even that is rather far beyond the radius of commercial possibility just now. Finally, there are the floating islands projected by Mr. Armstrong, their number and spacing being fixed only by conventional considerations.

The editorial columns are no place in which to attempt to detail the relative merits of the various routes, but it is appropriate to call attention to a couple of facts that apply to all of them alike. In the first place, the machines used must be seaworthy boats of some sort. No existing landplane, however multi-engined, is sufficiently free from the danger of forced landing to be flown over long stretches of water as a regular commercial service. Second, practically all of the possible alternatives present a problem of navigation which should overshadow everything else. Assured accuracy of navigation and under the worst conditions is a fundamental necessity. A lack of certainty that the island could invariably be located without waste of time and fuel in crossing around to look for them has been the principal factor responsible for the lack of an air service to Ireland. The location of aerial landmarks will be yet more difficult.

Nothing that now exists is good enough, although airplane navigation presents an obvious hope with further development. The reported point is that navigation be recognized as a key problem of importance commensurate with the improvement of the technical characteristics of the airplane. The difficulties in the way of trans-oceanic service by airplanes following some one of the "stepping-stone routes" are by no means presently insuperable but they are real difficulties. Their sudden conquest is not to be hoped for. They deserve the constant attention of those most industriously competent to deal with them, and over time without go to all serious workers in the field, but it will be most unfortunate if a recognition of excited consciousness an commercial Atlantic air service should distract either effort or patronage from undertakings of much more practical importance.

HIGHLIGHTS OF THE *Western Aircraft Show*

IN THE FACE OF general aircraft sales shows, the Western Aircraft Show held in Los Angeles, Nov. 9 to 17 inclusive, proved considerably that there does exist among the general public an active buyer's interest in aircraft. As a retail sales show the exposition was an unqualified success, and yet there were scarcely, if any, bona fide sales from the show floor. The success of the show lay rather in the very real buyer interest which was created in airplanes and in the many contacts and arrangements for future flight flights which will surely result in several sales during the period following the show. Probably for the first time in aviation show history, the healthy condition common to most amateur shows in that auto shows are not held for the purpose of making quantity retail sales, but rather to stimulate buying interest which will carry over through the sales process, and which will serve to build up a live prospect list in a clearer way than any other method.

Up until the present time the aviation industry has been sending its shows on cruise and sailing movements of planes to each city with a minimum of attention given to the general public, which after all is the ultimate consumer of all aircraft products. In August, 1958, in the center of the most highly competitive aircraft market in the world, almost every substantiated aircraft builder is actively represented in the Southern California territory, and since the Western Aircraft Show was probably a dealer's show the manufacturer did not enter the picture to any great extent. For that reason there were comparatively few introductions of new models, and the chief effort of the show was to sell the public on the desirability of purchasing an airplane, not because it was a glorious new model with shiny new representatives over the obsolete and antiquated ones in the next success, but because an airplane has become a highly desirable commodity of established worth, bearing a Department of Commerce License number.

Since Southern California people are supposed to be easily swayed, they have been "implanted" to distinction and the demands on the public is to attend this airport opening or that major program has caused a condition of antipathetic toward things aeronautical. With planes of almost every description on display at fifty odd airports in Los Angeles county alone the local public was induced to come along and learn that the show management anticipated some difference in granting sufficiency antipathetic. As outlined in a preliminary article on the Western Aircraft Show published in the Nov. 9 issue of Aviation, a great civic campaign was conducted in an effort to create popular interest. This campaign was a success and the public turned out



The Worldwide Air Company's converted biplane

in grasping numbers with a very high percentage of unit prospects among the show visitors. Full attendance figures for the nine days give a total of 70,000 paid admissions, which figure considerably exceeds even the record highs estimated by officials of the California Aircraft Exposition Association and of the Aerospace Chamber of Commerce of America when the show was first planned. Fortunately the show more than paid for itself, first net profit of approximately \$100,000, all of which money will be used to further the development of aviation and particularly of future aeronautic shows.

Exhibitors Show a Total of 57 Planes

Although not a national show, the Western Aircraft Show compares favorably with other recent aircraft expositions. A total of 57 aircraft were on display, exclusive of gliders, which is 17 more planes than were shown at the International Aerospace Exposition of 1958 in conjunction with the National Air Races at Milwaukee, Calif., and two more than were shown under the exposition building this year at Cleveland. Some interesting comparisons are offered by the planes shown. Of the 57 planes in the show, sixteen were of western manufacture and 41 were built east of the Rocky Mountains. Of the Western planes, thirteen were single place and four three-biplanes, a figure four to one in favor of monoplanes in the western manufacturers. The eastern planes, on the other hand, were divided into groups of 28 biplanes and only fifteen monoplanes. It is interesting to observe throughout the world is toward monoplanes, as it has seemed that the west nationally at least must be considered the most progressive section of the industry in developing new designs. Again, in

Increase in sales is the real test of an aviation exposition, just as it is in every other industry. The Western Aircraft Show recently held in Los Angeles was staged with this idea in mind, and dealers report surprisingly large lists of live prospects. In addition, the show netted a profit and the attendance was larger than expected. Some of the highlights are given in the accompanying article

thinking "Show" planes were the five Great Lakes, each with a different color combination. Two of them were equipped with the new Goodyear Air Wheels, the Emco "Challenge" and the Lazarus "Cirrus" landing trainer, which were implemented in highly artistic green and gold finish; the two Cessna planes, a two place open-trainer monoplane finished in orange and silver, and the three place twin monoplane finished in orange and silver, and three shades of blue, and violet, the Curtiss Robin.

Passenger monoplanes in a mid-size flight passenger and transoceanic pale blue and silver after a striking pattern and the recently-painted Moreland monoplanes, the M-1 three-place semi-cabin monoplane finished in blue and gold to resemble a beautiful bird; and the Moreland M-2 cabin monoplane in blue and silver. That the distinctive colors and decorative patterns took the public's eye is abundantly demonstrated and the manufacturers may well consider it worth their while in future not only to take part with the same job of "Show" planes, but also to color and outline production models more strongly and distinctively. A prize for the best exhibit went to the Greater Maypole Company of Long Beach.

From the spectators standpoint, the very availability of many upholstered chairs in the various exhibits offered me both the opportunity to rest occasionally, to talk over the merits of a particular plane at length and in comfort, and to sit down and study various planes at ease. Another valuable idea which seemed carried farther than at any previous show was the



A view of planes displayed in the center of the Western Aircraft Show. In the foreground is a Lockheed, Model 10, 100 ft. long, and in the background is the McDonnell, Model 10, 100 ft. long.

principle of luring the public to climb into the various planes and get the "feel" of them, convinced platoons to make voluntary to make aviation and exit from color or concept even more than it would normally do. Therefore Soltész, liaison director for southern California, was assigned the best situations at the show.

Pulver Shines Interest at Glider

ONE INTERESTING MILESTONE was the number of gliders exhibited and the great interest shown in them. Five gliders were on display, and from the crowds which examined them approximately it is evident that gliding is on the up-grade. W. H. Bowles exhibited the Bowles sailplane designed by himself and constructed by the Bowles Sailplane Company of San Diego. This glider is of the soaring type, having a long wing span, with wing span of approximately 10 ft., a weight complete of less 175 lb., and a price with complete engine of \$600. The cockpit, in which Mr. Bowles recently set a new American record of one hour 21 min. 31 sec., was displayed. The record of one hour 21 min. 31 sec. was broken by the record of one hour 22 min. 10 sec. Another all steel glider was shown, the small built by largely of Aerostar products, made from monocoque primary under skinning lacquered frame for \$307.90 and a source of \$50.00 open were exhibited. Another unpowered glider was the primary trainer of "Zigzag" type built by the Los Angeles Glider Club and placed on the show. Any amateur factory might well be proud of the workmanship of this model.

The showing of three planes with the new Goodyear Air Wheels would seem to indicate early popularity for that size equipment. The two small implants displayed, the Warbird-powered Herald, and the banner-powered Savoia-Marchetti attracted much attention and favorable comment, probably indicating the small implant for the spectator or independent business man. The showing of three interengined planes of six, eight, and ten-place capacity, the Ransome, Fieseler, and Bach respectively, serves to emphasize the belief of western builders that there is a market for the multi-engined medium capacity plane.

A large portion of the show was given over to aircraft, throughout the period of the show, the Polaris Super-Douglas, in the rear of the main building, and which aroused much interest among those flying for pleasure at the time of purchase. The little glider seemed to be the most popular, although much heat depended upon official approval of both plane and engine and upon the actual service which



A Rutledge Monoplane on display.

results were obtained in the demonstration, the Wasp engine being turned over steadily even when quite cold. Among the planes given their first showing were the Morane-Saulnier M-2 Trainer, the Barn "Popper" sport biplane, the biplane "Catalina" monoplane trainer, the Fieseler "Joker," sailplane, monoplane, the Göttinger monoplane trainer, and the American three place plane. They will be described in more detail in future issues of *Aeronaut*. Some features of unusual merit, however, deserve mention here. The Cessna training plane has been so designed that the wings, landing gear, and tail surfaces are all interchangeable with the Courier three place cabin plane, each model being powered with the Kinner engine. It is readily apparent that this feature will prove valuable to the dealer who must make parts, to the school operator using both planes, and to the educational owner, who may stay by purchasing a training model, and later convert it into a cabin plane simply by replacing the cabin fuselage. The Barn Popper is a high performance seaplane/biplane of two plane capacity and built around the American Cirrus engine. Because of simplified design this model is offered at \$3,995. Conventional construction is used throughout except that the fuselage is built of square section steel tubing, which is easier to cut and fit, resulting in a less expensive fuselage. Another feature of the Popper plane is the use of a single vertical stabilizer which when rotated a full 180° allows deck clearance.

The Cessna plane with Kinner engine has been granted an approved type certificate. It is of conventional panel monoplane type of sturdy construction.

The Javelin monoplane, designed by Major S. C. Parr and built by the Pasadena Aircraft Corporation, exhibits a number of unusual features. The fuselage is quite "fat" which gives the five passengers a great deal of room; narrow ailerons extend the full width of each wing panel; and tail surfaces are comparatively small. Two pilot seats side by side in an open cockpit in the nose forward of the wing, while the engine is carried under an N.A.C.A. type cowling.

The Standard M-2 is a conventional panel two place training monoplane equipped with Goodyear Air Wheels mounted on a rigid landing gear. The Aerocar is a 10-hp aircraft of the ultralight class which can be easily transported over rough terrain by motor, stepping the plane by a reverse kick, and running the plane backward to its original position. The popularity in the invention of C. E. McCord, a Los Angeles man, and has already undergone extensive ground and flight testing. It is being developed under the supervision of officials of the Rosedale Oil Company and will surely be heard soon somewhere this device. Working by means of mechanical devices operated by the pilot within the cockpit, the propeller pitch adjusting mechanism has every assistance of being foolproof and satisfactory. The blades of Standard Steel manufacture, are held firmly in large hub saddle bearings and the pitch is positively set by means of a nut and screw mechanism. Also demonstrated at this Farnier plane was a new straight line drive electric starter invented by Verna C. Hodges, of Los Angeles. This invention is said to weigh half as much as the ordinary starter and enterprises a positive release which prevents damage due to kick back or engaging while the engine is in operation. Excellent

such a plane will render when you go to work. The price set on it was \$3,880.

Among the other exhibits, some need our particularly such as a gleaming white Lockheed with N.A.C.A. cowling and streamlined wheel strakes, "panas," which was displayed in the Donair Aircraft section, together with the two planes, the P-1 UX-5 powered plane, and the P-2 Apache powered machine, are a side-and-crosswing Ryan Brothers. The Westland Avro, Fairey, Gloster, Armstrong Eagle, Seaflower, Butler, Starman, Pionier, and other exhibits, were all attractively arranged. There was a lot of attention centered on the low wing Barling BB-3, which featured two views of castaway sections of the distinctive wing construction. The crowds were also interested in the Goya Mash and Whittemore Avus, each with slotted wings and oil or grease the folding feature. Crowds were constantly attracted to the Curtiss section by the operation there of a racing feature which consists of a small model plane suspended in the center from a massive wind tunnel by the operation of full nose controls.

The Engine Displays

Engines displayed included the Pratt & Whitney Wasp and Hornet, the Bristol Siddeley-motored Kinner engines showing all working parts, the new T-2 Aviasix, the Curtiss "Challenger," the American Cirrus, and the improved Comet engine, which was so shown that the novel Comet valve action was easily seen.

The feature of the engine section was the announcement of two new engines, the inverted radial four cylinder Menasco "Prince" of 90 hp at 1800 r.p.m. with a weight of 250 lb., and the Aquila series a 200 and a 300 hp engine, each of seven cylinders. Both of these announcements entry unosed weight at this time. The Menasco engine has undergone a long period of development and flight testing and is now about ready for quantity production in the Los Angeles factory. The advantages of the inverted type are of course obtained high efficiency, low center of gravity, high thrust/lb. weight, utilization of space in the cockpit elevation of engine fuselage on the cockpit, and lower crankcase dilution. With these inherent advantages, S. P. Menasco has secured a large number of plant contracts and is very popular for small sport and training planes. The Aquila engines are the first to employ magnesium metal or Bellalite, in all case castings. The result has been a greatly reduced engine and high power to weight ratio. The thick sections of the lighter magnesium castings have also helped to increase the general strength of the engine. Ball and roller bearings are used throughout, with exception of the crank joint. These ingots have been subjected to lengthy tests and will shortly be submitted to the Department of Commerce. Upon approval a production program will be inaugurated in the factory located at the Los Angeles Metropolitan Airport.

Among the booths there were many model displays, with a strong leaning toward miniatures, and other aerial lights or flashing lights to attract the attention of the visitors. The Rutledge Company offered a most complete line of aluminum parts and the Paul Ordahl Cutlery Company, an impressive display of the tools in which carbon is present. The latter company were all well represented. Standard Steel, Gulf Sheet and Glass also having excellent displays in miniature or lighted airway maps or models. Scale models of airports were shown by the Grand Central Air Terminal, Los

Angeles Metropolitan Airport, and United Airlines, the new Boeing development at Burbank. The air transport section such as T. A. T., Matson, Nevada Air Lines, etc., were particularly well presented in ample booth space. The new Douglas aircraft section, consisting of the P-1 UX-5 powered plane, and the P-2 Apache powered machine, are a side-and-crosswing Ryan Brothers. The Westland Avro, Fairey, Gloster, Armstrong Eagle, Seaflower, Butler, Starman, Pionier, and other exhibits, were all attractively arranged. There was a lot of attention centered on the low wing Barling BB-3, which featured two views of castaway sections of the distinctive wing construction. The crowds were also interested in the Goya Mash and Whittemore Avus, each with slotted wings and oil or grease the folding feature. Crowds were constantly attracted to the Curtiss section by the operation there of a racing feature which consists of a small model plane suspended in the center from a massive wind tunnel by the operation of full nose controls.

These latter were particularly attractive since the model was securely enclosed in a streamline fairing.

It was announced that the new Goya struts is a considerable improvement over previous models, since weight has been reduced, shock absorbing action improved, and durability and freedom from loss of oil or damage as account of dirt and grit has been increased. Two models of the Bock Haager were shown in the Western Air Express exhibit, the Texas Oil Company displayed a working replica of the Sun God refueling truck that rounds the flags across the continent and back, and the Union Oil Company displayed a scale model of the Rohrbach Stinson flying boat, in which all three propellers were constantly in motion.

Another feature of the show of particular interest to relatives of and to the aviator was the model plane section which featured about 1/5th scale models ranging from a perfect replica of the Sikorsky helicopter with a wingspan of just 6 ft. to a beautifully constructed canard-wing, unpowered, with a span of 10 ft. All types of military and commercial planes were faithfully reproduced in replica in this exhibit.

Ridgefield Commercial Unveiled Success

Since the Western Aircraft Show earned money for its sponsors, satisfied its exhibitors, and delighted its spectators who turned out in unexpected numbers, it must be considered as an unqualified success. Not only does the singer well for the immediate future of aircraft sales but it also serves the Aeronautical Chamber of Commerce of America well with a bang on its program to sponsor and encourage the various sectional shows which are to feature in the future in other parts of the country. The most credit can be given to the type of industry that united under the leadership of Fred A. Worthly, president of the California Aircraft Exposition Association, for the purpose of staging a real sales campaign.

To sum up the show's benefits to the industry itself, as represented by Southern California distributors, the observation of one exhibitor will probably best express the general sentiment. This man, a former automobile distributor and now dealer for a leading line of aircraft sales during the first three days of the show, than he had ever obtained prospects for the purchase of aircraft during the entire period of any seven different consecutive shows as when he had exhibited. The Western Aircraft Show has unquestionably been the biggest single factor in opening small airplane sales in the territory since retail selling of aircraft was an organized, and it brought to the forefront the beneficial effects of such a show as this has been will be felt by the whole industry over a considerable period of time.

C. L. E. B.
Browne, Di-
rector of Air-
ports, City
of Los An-
geles, Calif.
and Chair-
man of the
Conference.



ACCOMPLISHMENTS OF THE

All-Western AIRPORT CONFERENCE

Representative Group Meets in Los Angeles to Discuss and Speed the Solution of Western Airport Problems

In ACCORDANCE with the program of the Airports Section of the Aeronautical Chamber of Commerce of America, the All-Western Airport Conference held in Los Angeles, Nov. 7-8, was called primarily to bring together the leading airport executives of the western states for the purpose of forming a permanent organization to expedite handling of western airport problems. This plan is also being followed with other sections of the country; the various sections such as New England, Northwest, Middle Atlantic are doing of the greatest help to the Airports Section of the national body in so understanding the consideration of airport problems as to greatly speed their solution.

Properly the most important work of the All-Western Airport Conference was the selection of members for the by-laws committee and the Nominating Committee which set up the machinery for the functioning of the Western regional section. The by-laws as proposed by chairman Wadsworth Dillier of the by-laws committee and adopted by the conference stated that the organization should be known hereafter as the Western Airport Conference, a part of the Airport Section of the Aeronautical Chamber of Commerce of America, that the organization should function around an executive committee of eleven members, one from each of the eleven western states; that the chairman of this executive committee should be selected by the committee members; that the committee should meet at the call of the chairman; that the chairman should appoint certain standing committees in various sections of the territory for the consideration of special airport problems; and that two members of the executive committee should be selected as national delegates to the Airport Section of the Aeronautical Chamber of Commerce of America.

The report of the committee on organization by Robert J. Prentiss, Esther J. Warren, Flying Nightingale, and Col. Charles P. Boyce, Director of Airports for the City of Los Angeles as chairman of the conference. Colonel Boyce was also named as delegate to the national body and Arthur H. Abel, assistant general manager of Oakland Airport, was named as second delegate. Other executive committee members were for Oregon, Sealy V. Hall superintendent

of McFarland Airport, for Washington, David G. Long, manager of Boeing Field, Seattle; for Idaho, Mrs. J. D. Wood, Commissioner of Public Works for the State of Idaho; for New Mexico, William F. Hale, for California, Arthur Hardy, for Arizona, Kirk T. Moore, manager of Parks and Improvements for the City of Denver; for Montana, E. E. Morrison; for Nevada, Capt. Romeo Turner; and for Wyoming, Clarence Hobley. The report was adopted by the conference. This was set up the machinery and officers for the functioning of a body which will attack the very red problems faced by the west with its sparse population, rugged terrain and heavy air travel, incident to the establishment and successful operation of adequate airports.

Small but Enthusiastic Group at Opening

The All-Western Airport Conference opened Thursday evening Nov. 7, with a small but representative and enthusiastic group present. The total registration was approximately 60 persons, with at least one man from each of the eleven western states. Perhaps the most important accomplishment of the conference was the adoption of three resolutions at the close of the discussion period.

The resolution of most significance to the western states was that presented by the Hon. J. D. Wood of Idaho, and adopted by the conference, as follows:

"Since the welfare of the nation only is expedited to assure a role similar to those of the railroads and highways, both of which have received Federal aid and funds in case of national emergency, national airports become of prime importance and

"Such adequately developed population and wealth makes inevitable the assumption of all airport cost to each locality in which development is necessary."

Therefore the committee recommends that the All-Western Airport Conference agrees to the principle that the responsibility of developing adequate airport facilities in America, aside from private industrial enterprises, belongs to the Federal, State and local governments.

The committee further recommends that a committee

be named to study the problems and work out a plan whereby the whole responsibility may be equitably and jointly apportioned among these various governmental agencies, so that each may bear its fair proportion of the burdens, and no more."

The suggestion incorporated in the last paragraph will be carried out by the new chairman of the conference and a report on an initial plan for equitable Federal and State aid will be presented in the near future. It is readily apparent that the West, with its comparatively small population and wealth, is more in need of Federal aid for an airport program than are some other sections of the country.

An important resolution adopted by the conference was presented by Ruth Orngreen, chairman of the Uniform Airport Rules Committee, and which read:

"Research as to uniformity in Airport Rules is desirable and important as the Department of Commerce has issued

a Bulletin, No. 20 Oct. 1, 1939 on 'Uniform Rules for Airports.'

Therefore, it is resolved that the committee recommended that all airports use the Department of Commerce suggested uniform airport rules as a basis for Airport Rules and that a standing committee be appointed by the Western Airport Conference to take up these rules with all airport authorities in the Western States. This committee is also requested to advise with the Aeronautical Chamber of Commerce and the Airports Division of the Department of Commerce to uniform signs and codes to be used in control tower.

Sources of Revenue Clarified

AN IMPORTANT REPORT was presented at the close of the conference by Arthur H. Abel for the Committee on Standardization of Airport Charges. The report was quite lengthy, going into all phases of airport revenue



The Western Airport Conference luncheon in the Hotel Atwood, Los Angeles.

in considerable detail. However, all legitimate sources of airport revenue were classified as follows:

- 8. Hangar rents
 - 9. Losses on ground with improvements
 - 10. Losses on ground without improvements
 - 11. Commercial charges, fees for the use of the port.
 - 12. Office, shop, and locker rentals.
 - 13. Consumables.
 - 14. Landing fees
 - 15. Facility charges, tow cars, compass swinging platforms.
 - 16. Sale of supplies
 - 17. Charges for services of mechanics
 - 18. Charges for admittance of visitors to the field.

The committee felt that the first three charges listed above should be based on the book value of the port and improvements theron and must be fixed on such a percentage basis as to allow for carrying the cost of improvements, and eventually of the land itself. In addition, it was felt that private ports must make an added allowance for profits on the operation of the

It seemed to the committee impossible to fix any exact schedule of charges on larger rentals, but it was felt that charges should be on an as large a scale as possible and should be based on actual floor space rented. It was thought that there should be no charge or a very low charge for the use of the airport, and that there should be no parking charge for spectators. The committee felt that it was not possible at this time to set up any standard basis of charges for supplies or the service rendered by mechanics leaving these charges rather to the various local conditions to determine.

This report was summed up in the following words: "Your committee believes charges should be based on actual value given. That landing charges should be waived for the time being, that location and accessibility matters be considered in fixing rentals of alienated and similar facilities, that concessionary pricing perhaps gas and oil be based on a flat-rate basis."

Arthur H. Abbot: Democracy Reconstructed

Presentation of all papers was completed on Thursday, Nov. 7, with discussions of those papers being carried on during the several sessions that followed Friday and Saturday. During the first morning session presided over by Wilson E. Hock, New Mexico news papers were presented. Arthur H. Abel, assistant general manager of Oakland paper, presented a lengthy paper dealing with "Standardization of Airport Business" based on approximately ten years of experience at the Oakland port. Mr. Abel emphasized the fact that the Oakland port is a part of the greater Pacific development, advanced by the recent political border changes and that there is a trans-

an even way from the start. He said that land leases, payment per airport costs, but that airport charges for various services would be relied upon to pay the costs of improvements and operations. Mr Abel stated that the Oakdale airport has cost the city approximately \$150,000 to date, but that the gross revenue for the fiscal year of 1938-39 will approximate \$35,000, and the net profit to the city will approximate \$35,000. Of this amount, 25 per cent was used to cover losses incurred by the city. Commercial operation fees for the use of the field are placed on a sliding scale ranging from \$30 per month for non-passenger planes to \$10 per month for passenger planes. The rates remain the same from December to March, while corresponding rates of \$45 to \$50 are charged during the months from April to November. Transient operators are required to register daily and to pay five cents for each plane carrying two passengers or \$30 per day for planes carrying more than one passenger. Passengers.

Mr. Abel emphasized the point that there are but two exclusive concussions on the post, one for a 36-mm. barrel.

An aerial photograph showing a large, irregularly shaped body of water, likely a reservoir or lake. The water covers most of the frame, with a narrow strip of land visible along the left edge. On the right side, there are several small, scattered buildings and what appears to be a road or path leading towards the water's edge. The surrounding terrain is mostly flat and appears to be agricultural land or open fields.

Bachman (Banks) Blame, which in 2011 was the name of the author's site Blame

which will bring in approximately nine per cent of the total revenue; and another for the restaurant and lunch counter which brings in about seven per cent of the revenue.

Companies selling fuel and lubricants are required to install and operate their own equipment on leased ground and pay to the airport one cent on each gallon of gasoline and five cents as each gallon of lubricant sold, thus securing for share three percent of the field's income. Other revenue is obtained from miscellaneous sources such as charges for hangar lights, field lights, locker and tool box rentals, side walk, wheel garage and tools, and various airport equipment rentals, as well as car rentals, telephone and telegraph messages.

In closing Mr. Eason said that close efforts are resulting in an average net profit to the company of about \$30,000 per month and that the operators of the fields are all self satisfied and making money.

At the meeting of the Air Traffic Control Board, Seattle, next presented a paper dealing with "Standardization of Airport Traffic Requirements" and based on *Aeronautics Bulletin No. 26*, Oct. 1, 1929. Captain Ladd further laconically compared the present air traffic rules with a condition in the world of football where every team might be permitted to make its own rules and a strange result he would enforcement of it find that the rules

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under which the game was being conducted permitted slugging the man with the ball, or playing with 15 men as a sole revision of 11. He also called attention to the present hazardous condition in connection with the operation of automobiles in that a driver may find varying regulations as to parking speed, turning corners, etc., in almost every town visited during the course of an extended tour. Captain Logue suggested that, in many cases it would be necessary for states to pass local legislation to relieve the fact that certain cities or countries are not represented by their chartered to air mail services. Captain Logue also recommended that the Boeing Field, King County, State of Washington, enacted a law which selected the entire subdivision of rates laid down in Bulletin 20, with only such additional clauses as seemed necessary to further protect the economy, the airport, and the corporation on the part.

One interesting point brought up by Captain Logg was that such changes as important may cause variation of the air traffic rules as promulgated by the Department of Commerce. He said that because of a ridge of hills near Boeing Field it had been necessary to call for a right turn when taking off into a north wind, and a left turn from the field when taking off into a north wind. A red flag in the day time and a red light at night, appropriately displayed, red for the left turn while green light or white flag is the signal for right turn. One phase of traffic regulation receiving considerable attention, according to Captain Logg, is the development of some safety feature airplane signals, and the provision of beacon lights which have code characteristics which will clearly indicate the field at which the beacon is operating. In closing, Captain Logg made a strong plea for the earliest adoption of the traffic rules worked out by the Department of Commerce.

J. D. Wiles / *Arts Deafness CM*

THE AFTERNOON SESSION, presided over by Dr. Fred A. Carpenter, of Los Angeles, included the presentation of three morning papers and one oral report. J. D. Wood, Commissioner of Public Works for the State of Idaho, made a strong plea for federal aid for school

A Salt Lake City, Aug. 26-27, 1929, and which board had urged the immediate adoption of airport building requirements according to Department of Commerce requirements. By all cities and countries independently equipped with airports. He further reported that the Aeronautical Chamber of Commerce of America, the National Aeronautic Association, the Goebelmen Fund for the Promotion of Aviation, and the American Bar Association, all seem to be in agreement on four important recommendations concerning the setting up of airports.

- positions concerning airports and air traffic, as follows:

 1. That aircraft should carry United States license plates only, and not be required to carry a license from such state operated in
 2. That state air marshals too, perhaps a tax money for aviation gasoline should be used to raise money for airport development.
 3. That air traffic rules should be left to the Aerodromes Branch of the Department of Commerce for solution
 4. That air transport operations are too young for any aircraft at rate control, or regulation.

Mr. Wood said that he could visualize the airport of Congress world great funds and authority for Federal co-operation, such as an airway would be in the simultaneous development of state and interstate airways based on systems of allied airports, with the Secretary of Commerce, the Secretary of Agriculture, and all State Highway superintendents available for assistance in developing the needed fields. Mr. Wood closed with an urgent request for the early adoption of some general plan calling for the provision of adequate facilities for aircraft operation in greatly increased numbers.

Woodruff De Soto, assistant director of airports for the city of Los Angeles, presented a long paper on "Marketing the Airport". He emphasized the importance of the right publicity and advertising, the proper treatment of the public, development of field facilities and beauty of field equipment and buildings in order that the general public may be brought to the airport in greater numbers to participate in sports using the field.



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Mr. De Soto asked the delegates to particularly note the uniformly attractive Spanish architecture which has been used on all buildings erected on the Los Angeles Municipal Airport, stating that he thought, this the first serious effort that had yet been made to establish a uniformly high standard of architectural beauty for buildings on an airport. He said that this beauty of surroundings at the field, coupled with the proper treatment by field officials, was of the greatest help to field operators or aircraft distributors in closing prospects for plane owners or sales.

Mr. De Soto stated that the city of Los Angeles plans extensive hillside, meadow, and deer and advertising of the facilities available at the new municipal airport, thus monthly damage for aviation enterprises are to be held at the port. He said that good all air areas in which no attention is permitted are available for building airport passenger in the towns visited. He also emphasized the fact that as airport's reputation depends upon the manner in which visiting planes are treated, and that it is important to avoid a photocall from the airports with the best possible equipment. Mr. De Soto closed with the thought that airports in the western states are developing and every possible form of publicity and exploitation is in order to attract public notice and bring added business for aircraft operations.

An oral report on the development of the Army primary training field at Mack Field, Riverside, Calif., was given by Capt. W. J. Harper.

Airport Operators and Management

THE FORTY AIRPORTS IN THE western and the presentation paper in the conference closed with an excellent paper on "Relation of Airport Operators and Airport Management," read by Webb D. Waterman, general manager of the Los Angeles Metropolitan Airport. Mr. Waterman grouped the various operators as: transport companies with large fleets of aircraft; air service companies with fleets of smaller two places; seaplane dealers and distributors; manufacturing private owners; and business owners. He brought out the difficulty of sub-



Grand Central Air Terminal, Glendale, Calif.

lying such a wide range of airport users and the necessity of so operating the airport that all users of it can earn a profit, thereby making it possible for the airport management to realize a profit. One interesting suggestion is Mr. Waterman's one that the operators themselves might be organized to enforce airport rules by means of an informal Kangaroo Court, thus saving the airport management considerable embarrassment in some controversial cases and avoiding friction between management and operators. He pointed out that under such an arrangement the airport management still has the authority to step in and punish a serious offense. Mr. Waterman advocated frequent meetings of all operators with the management, giving the actual ownership of sites and hangars by individual operators as an incentive to improving the appearance of the field and expressed his desire to expand the grouping of tax-exempt causes or pretences on the part.

Prudky's session was held at Los Angeles Municipal Airport in the forenoon and at the Western Aircraft Express Hotel, located on the Alameda field, in the afternoon. General discussion was concerned with all points presented to the conference. C. D. McMurtry, of the Los Angeles Bureau of Power and Light, engineer in charge of installation of lighting equipment on the Los Angeles Municipal Airport, urged that all lighting installations be submitted to the engineers of public utilities companies who have all the necessary data at hand and will gladly co-operate in an unbiased way on the solution of such problems.

Mr. Robert Prichard advised about the eventual levying of a landing fee at airports and Mr. Andrus Abel stated that he thought it would become general practice in the future, although not now regarded as a likely source of airport revenue. G. A. Campbell asked about the wisdom of charging admission to the flying field for special events. Mr. Abel replied that this could never be done at the Oakland Airport but might be in poor weather anywhere unless for some event such as the National Air Race program. Mr. Earle Douglass suggested that the public and the manufacturers with individual packages of flight parts and planes, enter with individual packages in the same class as the others in order to be in that class as much as possible.

In discussing traffic regulation, Mr. Prichard asked about the possibility of developing an automatic airplane system to replace flagmen on the runways. The general question was that flagmen are unreliable and a committee was appointed to study the problem of proper signals. Smoke pots as wind direction indicators were suggested and the conference agreed that the need for a uniform type of tail skid shoe be brought to the attention of the manufacturers if being suggested that some combination of the tail wheel and skid might be worked out to eliminate tearing up the runway except in emergencies requiring quick stop.

The third day of the conference was devoted largely to an inspection tour of Los Angeles County airports including the Los Angeles Metropolitan Airport, United Airport, and Grand Central Air Terminal. An official reception at the Western Aircraft Show concluding the work of the conference.

On the early appointment of standing subcommittees to study and report on airport problems and with the appointment of two delegates to the next annual airport convention in Buffalo, it is believed that this first Western Aircraft Conference has been a great stride forward toward the establishment of adequate ground facilities for aircraft operations in the western states.

THE Hall

SHIPBOARD FIGHTER

Wasp Powered XFH-1 Embodies Fuselage Designed for Emergency Flotation and Other Safety Features

By LESLIE E. NEVILLE

Technical Editor of Aviation

IN ORDER to meet the demand of the Navy Department for a shipboard fighter embodying the principle of emergency flotation and other safety features, the Bell Aircraft Corporation, Buffalo, New York, has developed the XFH-1. This aircraft, which was worked out in cooperation with the Bureau of Aeronautics, was recently completed, and has been undergoing a series of test flights. The XFH-1 is

a single seat biplane of conventional arrangement for this type of service, but having a number of noteworthy constructional features. Another interesting feature in addition to the water-right fuselage is a means of quickly dropping the landing gear in the event of a forced descent on the water.

The XFH-1 is powered with a Pratt & Whitney Wasp engine and complete military equipment is included



The Bell XFH-1 Shipboard Fighter, powered with a Pratt & Whitney "Wasp" engine.

in the installation. The airplane has a wing span of 32 ft., an overall length of 25 ft. 6 in. and an extreme height of 9 ft. 3 in. The weight empty is 1,755 lb. and the gross weight 2,514 lb.

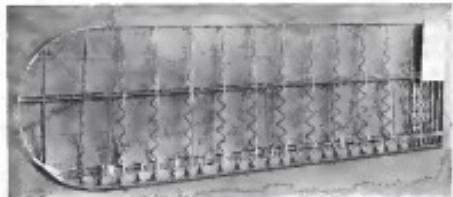
The structure is built entirely of metal, aluminum tubing being used in all principal parts. Wings and tail surfaces are covered with fabric. The general type of construction is the result of a number of years research by Charles Wurd and Archibald M. Hall and is used by certain other manufacturers. Several characteristics are noted in this design as well as in the general methods of construction adopted by the Hall



Fig. 1. Details used in the main trussing of the wing structure. Above—Bolted joint of a stringer in the main truss spar.

Fig. 2. Details of wing structure showing spar and rib construction, and drag struts.

Fig. 3. The increased wing joint structure. Note the various fastenings the chord members at the center.



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Company. Among these are the wide use of sheet metal skin and drawn section members, and the success with which accessibility for riveting has been obtained. Figure 1 also shows an obvious concentric locking and bolting out secondary stresses in the structure.

A considerable saving in weight is effected in this design due to the careful proportioning of the individual members. This saving is not attributable alone to the substitution of aluminum alloy for the more usual form of construction but is the result of thorough consideration of all principal structural members with the object of eliminating unnecessary material whenever possible. The principal members have been designed to resist stress even to the limit to which they may be subjected in service and what is more important over the smallest details in the design of the engine have been given the same consideration.

As previously mentioned secondary stresses have been treated with extreme thoroughness with several general objects in view. The design takes advantage of every opportunity to balance one secondary stress against another to reduce the effect of both. Whenever stress of this order could not be utilized to advantage they have been eliminated, in some cases by the use of full concentric joints and in others by controlling the curvature of the gravity axis of members subject to combined tensile load and heat as in the elimination of column stress. As certain points secondary stress has been introduced to relieve the first edges of spars hollow sections or to control the plane of flexure of unsymmetrical sections. The effective strength of such sections has been increased through restraint or forcing of their ends in nearly all cases where the deflection of the entire truss under load would then result in double curvature of the member. In cases where single curvature would result end fixing has been resorted to. Several examples of this principle will be shown in detail later.

Very gradual changes in length, width or moment of inertia in the members of various sizes have been utilized and formed a slotted high ratio sizes while also establishing a large ratio of length to width base beam and base. Each web member has been arranged to form an integral part of the entire truss. The various truss members have been proportioned for single curvatures and to approximately equalize angles. Toward as practicable, however, the shorter panels have been reserved for members that are most highly stressed in compression.

Wherever practical round tubing has been used for

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structural members while in other cases the form of section and stiffener has been used.

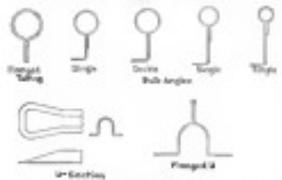
The wing consists of spans held up by shallock alloy tubes and ribs blanked and prepared from 1787 Metal sheet. Trailing edges and nose stiffeners also are of aluminum alloy. The tail surfaces are similar to the wings in general construction except that the spar consists of a single tube instead of the multi-tube truss used for wing spars.

Wing spars are formed of a plurality of tubes and the web members are also of tubular form braced at the ends and riveted to the chord members. The ratio of spar depth to span width in relation to the length of the lift bags and the drag bays is carefully maintained. A high efficiency in deflection attained by this form of cross section.

Wherever, as in a truss or lattice column, the diagonal web system transverses a rectangular gusset plate, the secondary stress in the chords advancing the gusset is very large, often being 100 per cent. of the primary stress. This is due to the widening of the column under load which accompanys its shortening. The diagonal web system has an tendency to restrain this widening but a rectangular gusset effectively prevents it, and so produces a large bending moment in the half panel adjoining. The panel joining plates of these trusses are of Y form obtaining very low profile and permitting of the attachment of lift and drag housing to the spars without interruption of the continuity of the diagonal web system. This diminution of a large secondary stress, otherwise present, allows the use of lighter fasteners for the spar shears. Incidentally the weight of joint plates is also much less.

Reduction of area of the chords where less stress was under combined load and end loads involves, for an upper spar, the reducing of the lower chord arm near the joint and of the upper chord arm near the joint. For a lower spar under such combined load the upper chord is reduced to support the lower chord and vice versa. This is accomplished by varying the cross section of tubes in the chord members at the joints. Such a variation in area between upper and lower chords results in a shifting of gravity axis of the spar section to a position away from its position of symmetry and nearer to the lower chord. In other words, the gravity axis of the spar has been cambered along the spar length in the same way as if the spar were bolted to a curved form.

In the condition of putting off of a due the lift load tends to straighten a spar constrained in this manner between its extremitie supports. If the spar has been correctly proportioned it will be quite straight when the



Standard aluminum alloy draw rivets recently developed for the Hall-Glenn.

extended maximum load factor has been reached. Thus the column bending moment otherwise due to the product of end load by the eccentricity from ultimate deflection has been eliminated.

Tests show that a standard spar of this type the ultimate load sustained is not approximately at the yield point as indicated by permanent set after the removal of a load increment. On the contrary these spars will sustain at failure 40 to 50 per cent more load than was required to produce the final well marked permanent set.

The principle of preventing failure by column action through a shifting of the gravity axis is also applicable



Method of making release joint in spar



Close-up of a biplane wing joint detail

in the gradual variation of the width of the web members in the rib truss. These members are of parallel cross section set into approximately 35 deg. angles. The apex is kept straight and the web is upset at its intersection with the chord sufficiently to center its gravity axis on the chord flange. This arrangement results in a gradually curved gravity axis of the web member on the chord flange, so that as the load is applied, to increase the compression at the apex of the section and to reduce the edges so that they will not break. The Hall-Glenn has joined the web members to the chord frame offset through their slightly a cylindrical end fitted to both.

Further reinforcement against buckling is used for the rib chords, the outer fibers of which are occasionally braced in a gusset joint. Such bracing adds about 16 per cent to the ultimate strength of the entire rib.

The ribs as a whole are of Z section and are perpendicular to the wing panel they are set at an angle of

86 deg. where the object of this being to check fatigue. In the lower wing panel structure the front spar chords are $\frac{3}{4}$ in. in diameter, $\frac{0.035}{4}$ in. wall, while rear spar chords are $\frac{3}{4}$ in. in diameter $\times 0.032$ in. wall. These are sheet tubes on an chord for the more highly stressed portions and two tubes for those less highly stressed. The spine web members are of 17S7 tubing $\frac{3}{8}$ in. in diameter, 0.039 in. wall and $\frac{3}{8}$ in. diameter, 0.028 in. wall. They are blanked and pressed from a 0.034 in. thick 17S7 Alclad sheet. The tips and trailing edge are of 17S7 tubing $\frac{3}{8}$ in. in diameter and 0.028 in. wall thickness drawn to oval jaws. Root stiffening is of 17S7 sheet 0.036 in. thick.

The length of the panel is 12.95 feet and the chord 46 in., and the area 50.7 sq ft. The weight per sq ft of structure is 0.962 lbs. Detailed weights are as follows:

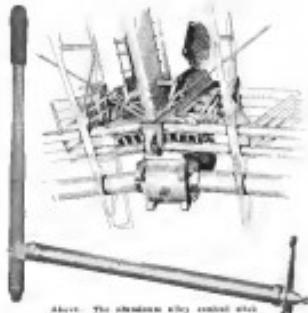
Bearings—front	6.70 lbs
Bearings—rear	2.21 lbs
Teasing edge	.37 lbs
Rods	6.25 lbs
Drag struts	.93 lbs
Drag wires and terminals	3.81 lbs
Fitting drag wire	1.10 lbs
Nose covering	4.50 lbs
Wing tip low	.25 lbs
Brackets	.50 lbs
Protective coating	.15 lbs
Braces	.30 lbs
Cover	1.25 lbs
Dope	.60 lbs
Waleways	.10 lbs
Hinge pins and nuts	.38 lbs
Total	42.73 lbs.

Ribs are of Clark Y airfoil section, weigh 0.205 lb each and support a load of 30.5 lb. In high incidence condition, Ailerons are mounted by a continuous hinge on their top surface. The fabric covering on the panel is drawn into slot on the under surface with a wire and no further sewing is necessary to secure the fabric.

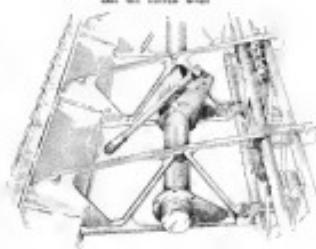
Drag bracing consists of tubular strips provided with spherically cupped end fittings each of which engage

the upper surfaces of a double hull bend tube. Drag wires are attached to the frame and spherically cupped end strips the exterior of which fit amanually. But, however, hull surfaces of the body which is passed through drilled holes in the strap and span joint plates and secured by a nut. The larger ends of these fittings are turned from forged bar stock while the smaller ones are blanked and pressed from sheet 0.036 in. thick.

The double hull bend bolts have been forged in size or turned from solid cast iron. The first method is very economical when quantity warrants first cost of dies. Drag wire stops are either blanked in dies or sawed to outline in blocks of ten or twelve stopholes and then pressed so as to cup them to a fit with the spherical underside of the bolt head. After this the round holes are drilled. These simple fittings, by utilizing very full end foot to the drag wires and by eliminating bending moment in the bolt and



Above: The attachment of a rib to the wing panel structure shows a rib being bolted to the panel with a central bolt and two side bolts. Below: A longitudinal view of the rib showing its internal structure.



adjacent spars, also torsion in the joint plates, result in very considerable saving in weight.

The deep capping of the strap and the widely separated points on the rim of the eye from which the strips fork lead, cause the line of action of the drag wires to intersect the bolt axis at its bearing on the span. Tests show that this arrangement fails at ultimate load by shearing of the bolt without perceptible bending. Since the span joint plates are free from torsion, they, as well as the span chord, may be lighter.

Boring of the drag strut fitting opens the upper surfaces of the bolt results in pressing them into perfect contact as loading is applied and, from the resulting friction, a fixing moment exists. This fixing moment increases in direct proportion to the end load and is in fact approximately equal to the normal product of the coefficient of static friction by the radius of curvature and by the end load. The fixing moment for any end load is thus computed definitely. On tests of the drag struts used in these wings this frictional fixing moment

was sufficient to realize a K factor in the hub formula of the 3×1.5 , the tubing being only moderately straight. This is a higher factor than can usually be obtained by working with circular metal and the Alclad tubing becomes increasingly straight up to the rating load and, when the friction is overcome, they pass suddenly to a curved form and continue to attain a K factor of 1 while so bent. When this load is removed the semi-axial becomes straight and may be released repeatedly with the same result.

The fitting for the left wing ailerons is the upper wing is also of interest and together with some plain weights 1.2 lbs. Lead in the left wires is carried through to both wings of the aileron while the drag load is also carried through Y plates and a lower center leg carries the load from the left aileron. The fitting is so designed that a standard wire and rod threaded barrel can be inserted in the hole and the two wires are screwed into the barrel in such a way as to leave very little of the fitting in the air stream. All hub and drag loads are eccentric, passing through one point in the fitting. The barrel arrangement allows the wire to align itself, assuring a straight lead.

The left wing aileron on the fuselage is a 17S7 forged frame through which the wires extend and serves as a standard bearing point for wire and fatigue. Lock wires are set against the barrel of the fitting and run on the sides of the tubes in the 17S7 fitting.

Jumping is required to the skin and frame. There is also a tie plate separating the aileron arm one side of the hub from the other.

The fuselage is of the monocoque type and is built entirely of Alclad. The transverse frames consist of standard 17S7 flanged tube sections $\frac{1}{2}$ in. diameter $\times 0.020$ in. thick and webs are 0.026 in. thick 17S7 Alclad sheet. On standard transverse frames below are flanged tube sections $\frac{1}{2}$ in. diameter $\times 0.020$ in. thick and webs are 0.026 in. thick 17S7 Alclad sheet flanged tube sections, while the webs on these frames are 0.030 in. thick Alclad sheet.



Empennage section showing stabilizer, rudder and fin.

Moved to gussets and angles formed from Alclad sheet. Longitudinal bracing consists of struts of hollow bolt angle section of standard 17S7 tube passing through the transverse frames. Both the transverse and longitudinal bracing are riveted to the Alclad sheet forming the skin or covering for the fuselage. The fuselage is water tight providing enough buoyancy to keep the airplane from sinking.

Both longitudinal and transverse frames are continuous from end to end. The longitudinal struts pass through holes in the transverse frames and in the water tight bulkhead. These struts are made watertight at the bulkhead by a cork inserted in the bulkhead and the clamps riveted to both sides of the bulkhead and to the struts. The continuity of the transverse frames is maintained by the skin which is riveted to the struts.

The dimensions of the material used in this fuselage follow. The skin or covering is 0.024 in. thick 17S7 Alclad sheet. The forged "U" shaped reinforcement on wing bays frames is standard section $\frac{1}{2}$ in. $\times 0.036$ in. 17S7 Alclad sheet. On standard transverse frames below are flanged tube sections $\frac{1}{2}$ in. diameter $\times 0.020$ in. thick and webs are 0.026 in. thick 17S7 Alclad sheet flanged tube sections, while the webs on these frames are 0.030 in. thick Alclad sheet.



Top Left: View of the rib used in the construction of the fuselage. Bottom Left: Rivets on the left wing aileron. Above: The partly completed fuselage structure.

Longitudinal struts are 1/4 in. angle section Alclad sheet, 0.020 in. thick.

The previously mentioned landing gear release consists essentially of pins in the forward fuselage fitting. These pins may be pulled out from the fitting by means of a lever in the cockpit. This operation causes the front part of the landing gear to drop free from the fuselage, the rear fittings coming on a ball head bolt until they are clear of the fuselage fitting, after which the



Shows a detail photograph of the landing gear showing offset arms.



Shows a diagram of the offset joint and strut as it looks to the side.

main landing gear will fall. Another feature of the landing gear, necessitated by the use of the supports on struts and the landing gear shock absorber on the straight axle, is that the wheel axle is offset from the main axis of the landing gear. All struts are 175T tubing. At the lower end the aileron struts are bolted to a flange. On the main struts the aileron struts are connected with the outboard struts at their upper ends. The weight of the landing gear is 109.05 lb.

ALTITUDE IS CONTROLLED by three valves, and level turns operated by a quadrant. The quadrant is connected to the stick in the cockpit by a cable which runs over pulleys mounted in metal bearings. The weight of the gears and their housing is 37 lb., that of the torque tube 4.9 lb., while the weight of the quadrant is 35 lb. and that of the pulleys and bearings is 0.72 lb. The torque tubes are mounted under the wing and the aileron is operated from them by horns. The weight of the horn is 0.68 lb. and that of the 368.02 lb. elevators are also operated by horns made of Alclad sheet 0.024 in. thick and bent over to form a channel

shape riveted back to back to a similar horn. Both are connected to the torque tube by rivets. The weight of each horn is 0.28 lb.

The control stick assembly consists of the stick which is made from 1/2 in. diameter, 0.020 in. wall, 175T tube. The torsion portion of the handle has been reduced to 1/4 in. by tapered ends. The weight of this assembly is 1.075 lb.

The fittings on the ends of the torque tube are standard offset longitudinal fittings and illustrate an interesting characteristic of Hall construction.

In cases where it is necessary to join two tubular members and retain their full strength at the joint, a swaged ring fitting is used. This method is also used in cases such as that above mentioned where it is necessary to join tubes to rod fittings. A thick wall ring fitting having an angular depression is inserted into the smaller tube which is to be released into the larger tube. Owing to the larger tube a narrow ring of a size sufficient to fit in the depression is placed. The outer ring is then compressed with the two tubes into the depression of the inner fitting. To produce a joint of this type it is easier where there is tension the inner ring or ring is of polygonal cross section. Such construction properly proportioned develop the full strength of the tube in compression, tension or bending and when failure occurs it is definitely remote from the joint. Joints of this type are not intended in proportion to any detail mentioned as they can be supposed to have considerable strength, however, having a tensile strength of 4 per cent in 2 in. span, though appropriate relations between the thickness of the tube, the curvature of the fittings and the depth of the angular depression and also between the diameter of the tube and the length of the ring. A cut through one of these fittings shows no joint radius magnified to 20 or more diameters.

ANOTHER interesting feature is located in the construction of the gasoline tanks which there are two such having a capacity of 40 gal. These tanks are made of 0.020 in. Alclad sheet riveted in lap joints. The longitudinal seams are riveted in a plait cause the tanks and the open edges are welded to ensure gasoline tightness. The ends of the tanks are clinched for strength and are riveted to the body of the tank. The open edges are being welded to gasoline tightness. The tanks are completely filled with gasoline while the tanks are made increasing any accumulation of the rivets or of the material near the seams from the heat of the welding operation. The weight of the tank with filler neck is 16.9 lb.

The specifications as furnished by the manufacturer:

Wing Span	32 ft
Overall Length	22 ft. 6 in.
Extreme height	9 ft. 6 in.
Power plant	Fiat & Whiteman Wasp

Detailed Weights

Fuselage, engine mount, and cowling	285.02 lb.
Wings, including struts and webs	264.69 lb.
Tail surfaces, struts, and webs	46.97 lb.
Tail strut	15.88 lb.
Landing gear	199.05 lb.
Arresting gear	5.62 lb.
Power plant	946.41 lb.
Fuel equipment	84.64 lb.
Wright engine	173.5 lb.
Glass weight	254 lb.

Saving Weight at Low Cost

How Much Must We Pay for Increased Payload?

By HORACE C. KNERR
President, Metal Metallurgical Laboratories, Inc.

HOW TO SAVE WEIGHT without sacrificing strength and safety and without unduly increasing cost is a problem constantly in the mind of every progressive aircraft designer. Advances in the use of metal construction have done much to promote progress in this direction, and are in fact the insulation of use case in the larger types of craft.

When designing, saving weight must be used as the structural parts of aircraft, notably in the fuselage, the only material readily available was the commercial grade known as "cold drawn," which consisted of a low carbon steel containing about 0.17 to 0.38 per cent carbon and no alloying elements. This material was cheap but very brittle because of its low strength. Next came the Army-Navy No. 1025, containing 0.20 to 0.30 per cent carbon and made to more rigid specifications as to composition, physical properties and mechanical perfection, with a corresponding advance in cost. The alloy steel chrome molybdenum, No. 4135X soon followed. This was about 72 per cent stronger than No. 1025 in the normalized state and was only 50 per cent more expensive. It therefore represented a net saving in weight as well as in weight for equivalent strength.

Today the demand for still larger savings in structural weight calls for the use of heat treated alloy steel of high strength. The substitution here, however, of aircraft parts is necessarily a somewhat costly operation because of the relative nature of the members, the desirability of using electric heat and the slow cooling and start-up required. This would naturally affect the cost by the value of the weight saved in the craft. Yet, as in the case of the change from No. 1025 steel to No. 4135X, the increased cost of the material per pound is offset by a reduction in the quantity of material required.

In purchasing relatively expensive, the aircraft manufacturer naturally focuses his attention upon the cost per pound, overlooking the apparently obvious fact that it is a fixed cost in which he is extremely interested. He should recall that where strength of material per pound increases, less material will be required and therefore the cost will be proportionately reduced, while at the same time, a valuable saving in weight of the finished structure will result.

Actual Cost per Pound of Weight Saved by Using Best Treated Tooling

Yards	Diameter	Actual	Unit per	Weight	Cost per
Length	in. & Wall	Thickness	Foot	Reduced	Weight
100.000	1 x 1/2	46.000	11.00	11	10.000
300.000	1 x 1/2	20.000	11	108	10.000
600.000	1 x 1/2	10.000	10	487	10.000
100.000	1 x 1/2	20.000	10	100	10.000
200.000	1 x 1/2	10.000	10	200	10.000
400.000	1 x 1/2	5.000	10	400	10.000
800.000	1 x 1/2	2.500	10	800	10.000
1600.000	1 x 1/2	1.250	10	1600	10.000
3200.000	1 x 1/2	625	10	3200	10.000
6400.000	1 x 1/2	312.5	10	6400	10.000
12800.000	1 x 1/2	156.25	10	12800	10.000
25600.000	1 x 1/2	78.125	10	25600	10.000
51200.000	1 x 1/2	39.0625	10	51200	10.000
102400.000	1 x 1/2	19.53125	10	102400	10.000
204800.000	1 x 1/2	9.765625	10	204800	10.000
409600.000	1 x 1/2	4.8828125	10	409600	10.000
819200.000	1 x 1/2	2.44140625	10	819200	10.000
1638400.000	1 x 1/2	1.220703125	10	1638400	10.000
3276800.000	1 x 1/2	0.6103515625	10	3276800	10.000
6553600.000	1 x 1/2	0.30517578125	10	6553600	10.000
13107200.000	1 x 1/2	0.152587890625	10	13107200	10.000
26214400.000	1 x 1/2	0.0762939453125	10	26214400	10.000
52428800.000	1 x 1/2	0.03814697265625	10	52428800	10.000
104857600.000	1 x 1/2	0.019073486328125	10	104857600	10.000
209715200.000	1 x 1/2	0.0095367431640625	10	209715200	10.000
419430400.000	1 x 1/2	0.00476837158203125	10	419430400	10.000
838860800.000	1 x 1/2	0.002384185791015625	10	838860800	10.000
1677721600.000	1 x 1/2	0.0011920928955078125	10	1677721600	10.000
3355443200.000	1 x 1/2	0.00059604644775390625	10	3355443200	10.000
6710886400.000	1 x 1/2	0.000298023223876953125	10	6710886400	10.000
13421772800.000	1 x 1/2	0.0001490116119384765625	10	13421772800	10.000
26843545600.000	1 x 1/2	0.00007450580596923828125	10	26843545600	10.000
53687091200.000	1 x 1/2	0.000037252902984619125	10	53687091200	10.000
107374182400.000	1 x 1/2	0.0000186264514923095625	10	107374182400	10.000
214748364800.000	1 x 1/2	0.00000931322574615478125	10	214748364800	10.000
429496729600.000	1 x 1/2	0.00000465661287307739375	10	429496729600	10.000
858993459200.000	1 x 1/2	0.000002328306436538696875	10	858993459200	10.000
1717986918400.000	1 x 1/2	0.0000011641532182693484375	10	1717986918400	10.000
3435973836800.000	1 x 1/2	0.00000058207660913467421875	10	3435973836800	10.000
6871947673600.000	1 x 1/2	0.000000291038304567337109375	10	6871947673600	10.000

Figures in bold-faced are U.S. Army Standard. Figures in regular—these are based on cost of 100,000 lbs. and include freight to base training center.

Costs are based on delivered in U.S.A. lots and include freight to base training center. Freight rates are given in the table.

* Based

This is strikingly illustrated by the simple calculation given below. The assumptions are perfectly true under normal conditions but cannot be applied indefinitely, for, as is always the case in aircraft design, generalizations are dangerous and such case must be figured individually.

The cost of normalized chrome vanadium steel and seamless tubing of average size and gauge used in aircraft construction, and in reasonable quantities, is approximately 30 cents per lb. Some of the small sizes and thin gauges are more costly while some of the heavier sizes are lower in paradise price. Without loss of generality we assume that the strength of the steel is 95,000 lb. per sq. in., whereas, correct heat treatment will raise the strength to say ten times, or between 125,000 and 300,000 lb. per sq. in., measured,

while retaining excellent toughness. The use of heat treatment, either of stainless tubing in long lengths or of fastened parts, is reasonable question, may be taken at an outside figure, at 30 cents per lb.

Suppose now that a given aircraft member member weighs one pound per foot and costs 30 cents per pound, therefore 30 cents per foot. By heat treatment the



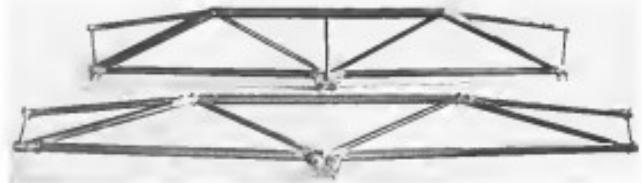
The reduction of tube length. Four tubes of equal diameter 10.00 in. long. Ultimate strength increased from 10.00 lb. to 110.00 lb. per inch.

strength can be doubled, or raised to 100,000 lb. per sq.in. For the same strength the tube need now be only half as thick as before. It will therefore weigh only $\frac{1}{2}$ lb. per ft., so that a saving in weight of 30 per cent has been achieved for this particular member. At a least costing charge of 30 cents per lb., it will cost only 15 cents per ft. In heat treat the tube, making the total cost the same as that of the unheat-treated tube, or 30 cents per ft. One-half of the weight has therefore been saved without cost.

Assumptions	Estimated	Cost Treatment
Ultimate strength = 100,000	10.00	100,000
Weight per unit	1.00	1.00
Weight per ft.	30.00	30.00
Heat treatment cost \$0.00	15.00	15.00
Total cost per ft.	45.00	45.00
Weight per ft. 10.00	5.00	5.00
Weight per ft. 15.00	7.50	7.50
Total cost per ft.	12.50	12.50

It is well known that in certain aircraft parts emerging under the hand of long columns the structural strength of the member is determined not by the tensile strength but by the elastic modulus of the material, so that heat treatment in such cases is of no value and a low cost strength is as good as a heat treat alloy steel of high strength.

But in a great many instances instead of external members of moderate length occurs in detail, by building of the wall. Here the strength produced by heat treatment is highly advantageous and contributes largely to the



Boeing 707 wing frame built around 30 ft. of sheetsteel welds.

structural strength of the member. For example, two aircraft units of stainless tubing were recently tested for the Bellanca Aircraft Corporation. One was in the normalized condition and the other was heat treated to a tensile strength of 200,000 lb. per square inch. The dimensions were as follows: Major Axis, 1.34 in.; Major Axis, 3.46 in.; Length, 33 in.; Wall, .065 in. They were tested as pin end columns. Failure in both cases was due to buckling of the wall. The results follow:

Wall of stainless steel, inches	Normalized	Heat Treated	Gauge
10.00 in. thick	21,000	20,000	81,000

Load at ultimate load, pounds

For members in which the principal stresses are tensile compression or shear, the true strength of the material is the normalized value. The cost of tube fabrication is proportional to thickness, so that a certain increase in the cost per foot accompanies a reduction in weight achieved by heat treatment to high physical properties. Furthermore, while a strength of 300,000 lb. per sq.in. can be had in certain parts, such as axles and large tubular sections, there are other parts in which the designer will be more likely to employ values of approximately 150,000 or 175,000 lb. per sq.in. In such cases, of course, the saving in weight will be less than 50 per cent, although still large.

A few examples based on the actual cost of tubing purchased in quantities of six feet, less than 500 ft. and including the cost of heat treatment at 30 cents per lb., have been figured and are given in the accompanying table. Examination of the figures will be enlightening to many who have not heretofore studied the matter from this angle. The cost of moving a pound of weight will be seen to vary from some 41 cents (stainless steel strength) to 48 cents, over a fairly representative range of sizes and thicknesses.

The value of the savings of a pound of weight in the structure of an airplane is subject to wide differences of opinion. For the present purpose it will suffice to grant that it is worth a dollar to save a pound. An English designer finds the closer comment that he would spend a pound to save a pound (moving, of course, a pound sterling at 85). Other estimates have been placed as high as \$25 a pound. The Army Air Service may, in some cases, apply a penalty of \$10 a pound for excess weight on combat jobs. One builder of large planes figures a value of 35 per pound saved. Based on any of these figures, the savings in weight producible by the use of heat treated alloy steel are extremely profitable.

LOWERING

MANUFACTURING COSTS BY Specializing Production

By CHARLES F. McREYNOLDS
Price Cost Editor of Aviation

AFTER TWO YEARS of amazingly rapid growth, during which production has each year doubled over the preceding year's record, the aircraft industry is still widely divided upon basic production problems. There are apparently two schools of thought, one which contends that aircraft are a low-signal business and should be built complete in one plant, as nearly as this is possible, while at the opposite end of the scale we have those visionaries who point out that airplanes are assembled from many separate units, each of which presents production problems of its own, and that whenever practicable these should be "farmed out" to organizations equipped to produce them efficiently.

Several Western firms have strongly adopted the latter policy, and notable examples are available of economies

effected by this scheme. In some cases the cost of certain units has been reduced to one-fourth of what it was costing the airplane builder to produce the same thing within his plant.

The Golden Eagle Airplane Company, after extensive experiment with a cascading department, has found that it can have pavilions built to specifications as are used the father east.

The company also has found it much cheaper to have work with subcontracted at the cell, and is planning to let out contracts for the construction of skeleton masts, and derivative bracket units used in the Golden Eagle "Cloud." R. O. Bone, president of the Golden Eagle Company, plans to extend this policy whenever possible and hopes to lower production costs by contracting for the manufacture of ribs, undercarriages, flying and engine controls, and other such items by outside companies. He points out that engines, propellers, tires, shock absorbers, wheel and brake units, instruments, radio case structures, batteries and small parts, are all being produced and supplied to the trade by manufacturers who specialize in such lines, and that



Interior of a factory unit devoted to the production of spars and wing assemblies.

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ri serious lagged to hope for the production of completed landing gear, wing ribs, spars, control surfaces, etc., by such organizations, at considerable savings to the aircraft builder.

This plan of dividing production into its component parts and having them turned out wherever possible by concern which specialize in such work, promises possibilities for materially lowering production costs throughout the industry. It is hardly conceivable that a single manufacturer can carry his factory and train his personnel to produce parts which involve the working of metal, wood, and cloth, with the various attendant techniques of sawing, gluing, nailing, riveting, heating, bolting or welding, as deeply as this work can be done if turned over to organizations already equipped for it and trained to handle it.

Our present industrial progress has been made possible by streamlining the division of labor to its highest power. Each of our modern industrial units is dedicated to the solution of some certain production problem. In this case a factory being devoted to the manufacture of nothing but seats, or bolts, or main blades, and within each of these factories we know that the cost is determined, and within each dependent, as far as possible, upon that which is imposed by contract by one organization. The general trend, however, the most complete gradation now seen on the market, it has taken the world's best engineering houses approximately 20 years to perfect a completely automated airplane from the first early flying machine. The problems of production engineering are just as involved as those of design engineering, and it is not logical to expect these problems to be solved overnight, nor, to be solved within a single organization. It requires a life time of study to learn how to properly perform certain operations. Also we know that costs are in most cases really reduced when we multiply the number of types that a given operation is duplicated. Therefore it seems sensible to first aircraft builders turning over certain parts of their tools to subcontractors who are specialists in that particular work, who have studied in great detail the problems involved, and who are turning out such tools in quantity lot.

On the other hand, the Hammon Lumber Company as typical of the average large lumber wholesaler and retailer, we find that this company owns no own timber, saw mills, lumber schooners, storage and handling facilities. Airplane sparage is selected as a matter of routine by company experts at the same rails. Shipping is clearly accomplished by means of numerous vessels and handling is by giant cranes on and off the shorelines, on end of the railroad cars, and in the company's storage yards, eliminating storage space in every operation. Within the yards the company stores lumber many months in advance of the arrival and thus greatly increases its stock.

Particularly interesting is the fact that all subcontractors is available in the yards and because aircraft parts are made in considerable quantities it is possible to specialize the mechanics and to keep the mechanics busy at all times. Wood not suitable for aircraft use is economically cut, dried, and graded to hope for the production of completed

schedule of six planes or more per month. In one case an airplane builder found the cost alone for a standard biplane were costing him \$250 per set when he had engaged his former for the production. The Hammon Lumber Company produced the same spans to the manufacturer's blue prints for \$175 each in the manufacturer on the first single job and this price could have been materially slashed as a quantity order.

The saving of turning over such types of production to the specializing companies is made apparent in this case for if his one or two aircraft builders would not patronize the Hammon Lumber Company it would not be possible to maintain an existing department. On the other hand, if all such work as the foregoing served by this company, were to be given to the spread department it would be possible to effect great saving in time and cut prices on to the price of the completed airplane.

I T IS PROBABLY wood parts the small aircraft builder is handicapped in a number of points. He must buy raw lumber in comparatively small lots and pay to have them shipped to his factory by rail, and to have the lumber sorted by hand labor. He must select his wood himself and such material as is discarded is likely to prove a small loss to him unless he can find a buyer. Since approximately 90 per cent of all wood used in aircraft is for structural purposes and since bar stock 10 per cent of the total amount available can be used for spars and struts, it is evident that the small aircraft builder will be at a disadvantage in this respect. It is also evident that a given operation will be too small to justify the purchase of a 60 per cent loss in sales production he must spend from \$10,000 to \$20,000 worth of machinery, much of which will be idle part of the time, and he cannot insure a crew of woodworkers to perform all the various operations in the wood working department because there will not be enough of any one kind of work to keep one man busy all the time.

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varied to parts for motor boats, automobile bodies, formers, etc., without any appreciable waste.

Another important factor is that the large lumber company can maintain a laboratory and trained engineers to test all grades of wood and timber cleated and acetate analyses. Upon the basis of such work it is possible that further economies can be introduced into the fabrication of wood parts and that strength can be increased with decreased weight.

Furthermore, when an aircraft factory is on a regular production schedule of a plane a week or more, it is possible for the mill to maintain a stock considerably in advance of the factory's requirements. The advantage of this reserve stock is doubly appreciated if the aircraft builder's planes in service should suffer crash damage requiring immediate repair which involves the replacement of wood parts drawn from stock. If the aircraft builder were forced to maintain this stock it would represent a considerable expense to him.

An additional service which the mill renders is to maintain a reserve stock on equipment parts and planes which may be required for use in aircraft development. This inventory gives the mill to draw on each needs without being forced to carry the parts in quantity in stock of its own expense.

Another important development is that of the Aerotex Products Corp., Los Angeles, which turns out steel rails of various types, hold-downs, wing tips, and control surfaces. Several Western airplane builders have made use of Aerotex products and W. E. Maranier, general manager, has announced that as Eastern firms as planned to meet the demand of some of the larger aircraft builders for Aerotex products.

Wing ribs of riveted stainless steel and of braced columns plated steel are produced by the Aerotex company and by specializing as the problems involved in this type of work it has been found possible to materially lower costs. Further economies are possible because of the fact that many airplanes use the same chord and wing areas and it is possible to build up a stock of the most popular wing ribs. When spur dimensions or locations vary it is a simple matter to meet the requirements of an individual company by means of an adjustable hold-down plate which is easily removable.

As producer of the more popular types of ribs it is possible that the cost of most ribs can be lowered and that in some cases establishments will find it practical to add their devices sufficiently to build a streamlined rib rather than to pay a higher price for a rib made to order. The advantage of such a practice from the service standpoint is also apparent.

This brings us the point of standardizing sub assemblies and it is evident that savings economies can be effected if such members as spars, ribs, struts, landing gear, wing tips, control surfaces, and other parts, can be standardized to some extent throughout the industry. These are, of course, apparently unanswerable problems to be solved before any such standardization becomes general, but just as all automobile are built with known features so all aircraft can incorporate certain common features which will make the quantity manufacture of certain portions of the finished product a more economical process.



Illustrates the economy of standardization in the production of various types of ribs.

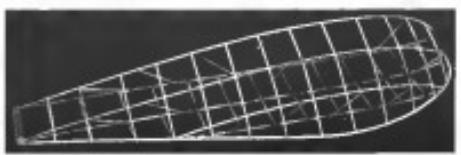
A step in this direction has been taken by the Aerotex company in the development of wing tips and control surfaces. Aerotex ribs and wing tips have been used in the new Commercial biplane while Aerotex ribs and control surfaces have been adopted by the Lockheed Corp. While this is a comparatively new field of development, Aerotex officials report that they can turn out these parts to the manufacturer's requirements for less money than he can build them himself, and that is surely less the saving besides even greater.

The Radiocraft Corp. is now testing a new type of wing and with it will be able to manufacture the wings and control surfaces required by subcontractors. These wings will reduce cost of Aerotex ribs and Aerotex, other parts of the wing to be fabricated by the Radiocraft factory, and it is thought that the completed wing can be supplied at a lower cost than the manufacturers are now paying, because of the concentration upon the one unit.

IN GENERAL it would seem that wherever the production of one item requires a considerable variety for recipient and cells for the exercise of a technique substantially different from that involved in the basic problem of designing and assembling the airplane, that particular job should be turned over to some organization better prepared to handle it, at least in such a case. Such organizations would not, and do not, depend entirely upon the aircraft industry for support, and changing design, design or practices will not greatly affect the manufacturing of some items such as tails, crating, acoustics, or wood parts. On the other hand, where a manufacturer builds his own units he is forced by seasons losses to be changed by design. If he buys wood spars from the mill and it means only the loss of a comparatively small portion of the outfit's total losses, the decision as to whether to buy from a mill is easily made.

If he builds his own wood spars and decides to develop and build spars himself we know that he must undergo heavy expenses.

The whole problem narrows down to a matter of equipment and experience, and if the expense of these Western concerns is too extreme, it would not seem economical for the average aircraft builder to seek to build up a sufficient quantity of both equipment and experience to meet all of the problems involved in the production of all the parts which go into his completed airplane. If we are to attain efficient aircraft production we can well make use of all the knowledge and experience of all the industries which can be allied with aviation. It seems apparent that the quicker we turn over the problem of metal working, wood working, special structures, tool construction, and many other of the various aircraft production problems, to those best prepared to solve them, the sooner we may hope for lowered production costs, increased sales, and efficient mass production of aircraft.



With steel wing tip developed by Aerotex Products Corporation.

Lockheed Low-Wing Completed for Lindbergh

SECRETLY, THE FLIGHTS have been planned by W. H. Miller, Lockheed factory test pilot, who has been working on the Lockheed project ordered by Col Charles A. Lindbergh. This plane is numerically the same type as that ordered by Boeing for his proposed trans-Pacific flight message from San Francisco to Tokyo. Lindbergh's plane presents many new requirements over the first low-wing Lockheed, the details of which have been closely guarded by the factory. In general the plane does not differ from earlier Lockheed models except that the wing is mounted beneath the fuselage.

The standard Lockheed fuselage is

used, but wing spans have been increased to accommodate a greater load. The new Lockheed plane is to have a maximum speed of approximately 430 miles per hour in level flight. There are two open cockpits in front of and above the wing, each with separate controls.

An especially notable refinement is the use of the Pitot tube.

It has been fixed in the front cockpit with an altimeter, speed, and climb indicator in the rear cockpit.

The plane has been fitted throughout with a radio, compass, and other instruments.

Course for coast flying are available at both Milwaukee and Los Angeles.

The new plane will be used for

the purpose of testing the performance of a fast radio and service station and a radio shack is needed there.

To facilitate rapid radio equipment changes, complete tooling and storage equipment is being reorganized.

Additional features are being incorporated for various other stations.

The engine for the new plane is

to be a Pratt & Whitney R-1830.

It is generally believed that

airlines and manufacturers under

secret contract will follow suit.

Aviation Register & Advisory Service, Inc., which it has done, is to do the work.

The organization will make plans for the new aircraft.

In presenting the money, Mr. Miller said: "It is generally admitted by members of the industry, as well as its bankers and attorneys, that aviation needs to create a greater market for its products. The new plane will be used to find in particular an educated public.

With few exceptions, adequate analysis of potential fields has been accomplished for various other aircraft.

This plane is to be the first to

attempt to circumnavigate the world.

The author, after consulting with

various experts, believes that

the new plane will be the first to

attempt to circumnavigate the world.

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BRIEFLY

Reorganization of the remaining divisions of T.A.T. was effected as a result of the merger with Midwest Locomotive. Several plant names have been replaced by such names as the Midwest Division.

National Glider Association has awarded a first class pilot's license to W. H. Bowlin, manager of Bowlin Skyline Company, San Diego, Calif.

Offices of Travel division of Commercial Flying Service have been moved from Oklahoma City to Tulsa. The company holds only a light hangar and shop at Oklahoma City.

Plans of Thompson Aerocraft Corporation operating in Michigan will be equipped with skis for winter operation.

Cobain Air Transport is planning to expand its operations in the Midwest and new aircraft and/or options will be secured on a suitable base at Portland.

Kirby-Kenn Aircraft Company, Sioux City, Iowa, has shipped three carbines of planes to The Western Kite-Kenn Aircraft Company, Los Angeles, Calif., during recent months.

Air Traffic Officer has moved from 815 Fifth Avenue to Room 1658, Lehman National Building, 321 Park Avenue, New York, N. Y.

Governor Harry E. Boyd of Virginia recently toured the airports of the state accompanied by a party of state officials and business men.

Airline Division, Inc., New York City, has had a certificate in the office of the secretary of state changing the corporate name to Investors' Problems Company, Inc.

Maurice E. Mossatt, one of the country's best known pilots, recently made his home in the city of Oakland (Calif.) Municipal Airport.

One Blue Brothers has been sold and two orders taken recently as a result of the Western Aerocraft share according to the report of Tarrant Safety distributor for western California.

Reports say Leo Salsano's plane was wrecked while he was attempting to fly to the sunken ship *Nanuk*, near North Cape, Siberia, was erroneous and he is believed safe, though he has not been heard from since.

As yet to the present cancellation of activity at Curtiss-Wright's Airplane Manufacturing Corporation plant, Walter Bentsch, president of Curtiss-Wright Sales Corporation, said that preparations for 1948 production are being completed and that the plant is scheduled to be returned within 60 days.

An electric parasite diver has been installed at the army station at Benson airport.

Increase in the demand for leather for upholstery in airplanes is reported

in Cleveland Flying Company, Cleveland, Ohio.

Pine Barren NH3 monoplanes have been shipped to the west coast distributor for the Shubael-Brooks Corporation at Los Angeles, Calif.

Race motors are used to be using racing engines near Windsor, Conn., for racing and model of airplane in motor racing competition.

Stevens Flying Corporation and Stevens Flying Schools have been merged and successfully tested on the new Racer engined transport plane in service between San Francisco and Cheyenne.

Aerial United of United States formerly restricted to central and southern California, carried out water contract with T. C. Hayes, San Diego, for the year 1948.

Aircraft Products Corporation of Canada, Ltd., has been converted to a branch of Aircraft Products Corporation of America, Detroit, Mich.

Establishment of Iron-Atlantic air mail service in three years, and passenger service, five to eight years, was predicted by Williams B. Stans, president of South Metal Airplane Company.

Cochran Aeromarine, Inc., and American Seaplane Service, Inc., of the Utah Islands established under the name of the former with capital stock up-creased from \$100,000 to \$200,000. Cliff O. Bruneau is president of the merged organization.

Midwest Aircraft Corporation, Minneapolis, no longer offers the Pan Am wing with the Konar engine.

New Firms Announced

Eagle Air Corporation, Bethesda, Md., capital \$100,000 shares of \$10 per share, by Clarence E. Smith, Charles Goff, and William H. Calvert, to start in aircraft.

Rouge Systems is planning to establish a shop at London, Ont.

Ridge Aviation has just started a ground school at Grand Rapids, Mich., with ten students enrolled.

Christian-Ross Planes Services, Inc., Miami, Fla., is offering special rates to members of Florida University Light Aeroplane Club.

Lederer-Techne Technical, Inc., Worcester, Mass., has issued a new catalog of aircraft parts and accessories, plans to build a Northern glider.

Dartmouth University students at Hanover, N. H., have formed a flying club of which J. C. Hobbs Jr., president, and the staff of AIAA is present, and plans for purchase of a plane are being formulated.

McMinn's Flying School, instructions will give a general school course in the University of Florida, Tampa, Fla.

University of Tennessee, Knoxville, Tenn., will inaugurate a general school course in the College of Engineering, some time in December.

Hicks Field Antennae Company, Clark, Inc., Buffalo, N. Y., capital \$200 shares of no par-value stock, by John Hicks, Terence Delaney, Clarence Nichols

AVIATION
November 30, 1948**N. Y. Air Commission
Conducts Law Survey**

ALBANY (AP)—The New York State Aviation Commission, of which Sen. J. Gravelle Welsh, of Duanesburg, Comptroller, is chairman, has been examining and research into every phase of aeronautical activities with the idea of recommending to the legislature of 1950, the addition of such laws as will give more teeth in eighth place to the regulation, enforcement and protection of air transportation.

The object of the Commission, which will be submitted to the Legislature about Feb. 1, will review the progress of the state's aeronautics program and will gather from the experience of other states as to the best means of handling the problems peculiar to flying.

Included in the data, will be the results of a survey which has been made of all airports in the state, their size, altitude and their location. The Commission has but one proposal, showing just where there occur in relation to airports, and will have them endorsed on a part of the report.

Later, they may be printed in pamphlet form, and be made available to aviators and others who might be aided by the information.

Schools and Colleges

SOUTHERN COLORADO AIR TRANSPORT COMPANY will open an aviation school at Pueblo, Colo., Dec. 1.

ARROW UNIVERSITY, Akron, Ohio, will open its first ground school October 1st.

ROGUE SYSTEMS is planning to establish a shop at London, Ont.

Ridge Aviation has just started a ground school at Grand Rapids, Mich., with ten students enrolled.

CHRISTIAN-ROSS PLANES SERVICES, Inc., Miami, Fla., is offering special rates to members of Florida University Light Aeroplane Club.

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MCMINN'S FLYING SCHOOL, instructions will give a general school course in the University of Florida, Tampa, Fla.

UNIVERSITY OF TENNESSEE, Knoxville, Tenn., will inaugurate a general school course in the College of Engineering, some time in December.

HICKS FIELD ANTENNAE COMPANY, Clark, Inc., Buffalo, N. Y., capital \$200

AVIATION
November 30, 1948**PERSONNEL**

EDWARD G. LOOKERMAN has been appointed chief of operations for Caldecott Airways system to succeed Donald E. Romano, Oliven, Calif. GOTHEKKE

WILLIAM S. GOTHEKKE, recently assistant manager of Memphis Airlines, has been promoted to a position with The Aviation Corporation holding corporation for the first company.

GEORGE REILLY has been made production manager of American Astronautical Corporation, White Plains, N. Y.

E. A. WATSON, president of Williams Aircraft Corporation, Wichita, Kan., and his wife, Dorothy, divisional Universal Air Lines, has been named chairman of the segregated committee of National Standard Parts Association, Detroit, Mich.

ROBERT CROWHURST, local passenger agent for T.A.T. at Wichita, Kan., has been transferred to Denver, Colo., by the airline, C. E. McRae.

LILLY LEHR LEE, vice-president and chief test pilot of Cincinnati Aviatel Company, has gone to South Africa as chief pilot of Pan African and Shirley planes.

FRANK E. WEILER, research engineer for Hamilton Standard Propeller Corporation, Wethersfield, Conn., has been transferred to the Los Angeles branch of the company where he will continue his research work.

ROBERT RAYMER has been made factory sales representative for De Anza Aircraft Corporation, to cover southwestern United States.

ROBERT J. NEIDART, formerly with the General Airlines Corporation, has been appointed project engineer with De Anza Aircraft Corporation, Denver, Michigan.

JAMES W. SIMON is the new general sales manager of Universal Aviation Corporation, succeeded Ray A. Balmer, resigned.

D. S. WALSH, supervisor of the western division of T.A.T., has agreed to accept a position with Boeing Systems.

DEE PLATT has been appointed sales manager of State Airlines Corporation, Atlanta, Ga.

LEONARD S. JAHNSEN, director of schools for Interstate Airlines, Inc., has been promoted to the position of operations manager.

A. S. KIRK has been named vice-president and general manager of Midwest Air Lines, Inc., Milwaukee, Wis., and was recently made the Eds liaison service board here, under supervision of Raymond B. Quirk of the Commerce Department, and George B. Scott, who represented the Travel Air and Midwest Companies and the Polar Aircraft Corporation.

ALBERT E. HARVEY has been appointed vice manager of Bowlin Skyline Company, San Diego, Calif. A. F. WATTS, recently sales manager of International Airlines, is now sales area director for Great Air Spring Company.

**A.S.M.E. Considers
Stocks, Gliding, Airports**

NEW YORK (AP)—Speakers at the Aviation Division meeting of the American Society of Mechanical Engineers, held yesterday at the Hotel Plaza, 21st and Grand Street, Manhattan, New York, were Edward M. Mandelbaum, Corp. President; Robert H. Gamble, and H. H. Rommier, all of Jacksonville, Fla., have been appointed to the advisory board of Florida Engineers, Inc.

LELAND S. JAHNSEN has been promoted to the position of operations manager at Interstate Airlines flying schools, with headquarters in Evansville, Ind.

MAURICE SEAGERT, James Tate, has been appointed general manager for Von Braun's Flying School, St. Louis, Mo. John J. Hulse has been made chief officer manager.

WALTER HEALEY has been appointed national passenger agent for Stein Air Service, Inc., Denver, Colo. Frank G. Grant, Jr., has been made assistant traffic manager of the Cleveland division.

He utilized all persons in investigating the situation, and can point to a number of the more factors influencing the outcome before revealing in the firm's records. Mr. Milton cited examples of what he noted by reading reports of several large insurance corporations.

Federal Planning Discussed

APPOINTMENT of the subcommittee to study the subject takes Mr. McRae, who said the following things should be taken into consideration: volume planning and 1—residential area available, 2—adaptation to ground traffic densities, 3—the scientific and technical nature of the proposed development, 4—adequate drainage, 5—protection of valuable material for humans to live in comfortably, own of trees, water, and sanitary, road and railroad facilities.

DISCUSSIONS of the future of the industry, Mr. McRae illustrated it with diagrams and showed pictures of the proposed Atlanta International. He explained in detail the use and operation of these sites.

GENERAL KENNEDY gave a talk on planes describing states of the type of aircraft belonging to Raymond E. Dowd, which were shown on the screen.

Test Eds-Ponsonby Travel Air

COLLINGWOOD POINT (T.A.T.)—Departments of Commerce lists were recently carried out on a Travel Air Model SE4000, a Wright J-6 powered liaison model, and a Travel Model 200, a 12-passenger plane, both of which were recently made available to the Eds liaison service board here, under supervision of Raymond B. Quirk of the Commerce Department, and George B. Scott, who represented the Travel Air and Midwest Companies and the Polar Aircraft Corporation.

It was decided that the Travel Air and Midwest Companies and the Polar Aircraft Corporation, although not yet received approval and the fourth type of Travel Air to be equipped with Eds ponson-

AIR SHOWS

Dec. 1-12
Air Shows—Air Show, Miami, Fla.
Dec. 14-15
Report EDITIONS

Jan. 1-2
Report EDITIONS

AIRPORTS AND AIRLINES



Aero Branch Urged To Start Port Rating

WASHINGTON (AP)—The Aero Branch is being urged by those interested in port ratings to make a proposal to the government to make an emergency rating of airports even though such a rating may have to be taken because of the incomplete information now available. It is considered that the main purpose of the rating is to give the department the power to take action if the department has been authorized to do so to afford a service to the aviation industry. Because of this, it is believed that primary consideration should be given to making available information as to the relative safety of the various airports as soon as possible.

It would be no better policy to be satisfied with information only at the airports according to these present conditions, it is pointed out, than to wait half a year for the government to receive permission pending the completion of an improvement program. Officials of the Department emphasize that the apparent slowness of the work is due to the desire on the part of all to keep organized the best possible program during the process of planning the completion of an improvement program. Officials of the Department emphasize that the apparent slowness of the work is due to the desire on the part of all to keep organized the best possible program during the process of planning the completion of an improvement program.

Beginning Jan. 1, the Miami International Airport will be opened to commercial traffic at 25 percent. Passenger rates are to be cut about 25 per cent. The Miami Caribbean Air Lines will operate for mail and express only, while the airport will be open for passengers arriving on a transoceanic flight from South America. Passengers will be allowed to travel on the weekly plane operated out of the Caribbean Basin Area but Passenger service is to be discontinued between Miami and Key West. Daily service planes will be operated daily over the Miami-Bahama line and the daily service between Miami and Nassau will be opened for the season beginning Dec. 1. The route will be Miami-Bahamas-Two Palms-Cayo Cangrejo and Cristobal-Chiriqui for passengers. These changes represent a new policy for Pan American Airlines.

Company to Own United's Ports
NEW YORK (AP)—A new joint business unit of the group of companies controlled by United Aircraft & Transport Company. This is United Airports, Inc., a concern organized with other airports throughout the country. At present the new company owns the United Airport at Hartford, Conn., and the new Pratt & Whitney field at East Hartford. These places and others are the present subsidiary of the parent company. It is planned to issue some 2,500,000 shares of stock.

P.A.A. to Extend Passenger Services

NEW YORK (AP)—Pan American Airlines, Inc., is to increase the capacity of trips on certain of its routes and add passenger service to lines formerly carrying mail exclusively. They are as follows:

- Beginning Jan. 1, the Miami International Airport will be opened to commercial traffic at 25 percent. Passenger rates are to be cut about 25 per cent. The Miami Caribbean Air Lines will operate for mail and express only, while the airport will be open for passengers arriving on a transoceanic flight from South America. Passengers will be allowed to travel on the weekly plane operated out of the Caribbean Basin Area but Passenger service is to be discontinued between Miami and Key West. Daily service planes will be operated daily over the Miami-Bahama line and the daily service between Miami and Nassau will be opened for the season beginning Dec. 1. The route will be Miami-Bahamas-Two Palms-Cayo Cangrejo and Cristobal-Chiriqui for passengers. These changes represent a new policy for Pan American Airlines.

Nitrus Ranger Strength Tested

CLEVELAND (UPI)—Tests conducted by the National Bureau of Standards against aircraft fuel showed some 100 aircraft engines to be damaged by the nitrous oxide. The tests were conducted by attaching three additives to the fuel tank of each plane. One additive was nitro-glycerine, another was nitro-glycerine and the third was nitro-ether. After applying a Geometric pressure of 80 psi over 8000 ft, it was found that there was an average deflection of 2.3° and an average deflection of 2.1° in the units that had received nitro-glycerine. All of the engines except one made some kind of a rating of all air ports except those that are restricted to local air traffic.

Demonstrate New Sprinkler For Hangars

NEWARK (UPI)—Tests on a new "dry" sprinkler system for controlling hangar fires were started out Nov. 20 at the Colonial Hangar at the Municipal Airport under the auspices of the City of Newark and the Fire Protection Association of America. Engineers and owners of the apparatus—Firestone tires—were arranged to provide a comparison between the new system and the more common "wet pipe" system. The dry system consists of a dry pipe which contains no water or liquid except when called for by expansion of heated air forced below metal bolts through auxiliary valves, and is then activated only by rise of temperature, rather than specific temperature until the system is activated by dry weather.

In the first test, the dry pipe system was set off at 80° after the lighting of 30% of explosive on the floor and was extinguished at 100° after the fire was 45 sec.

The heating of 10° sec. and 40° sec.

of moisture filled to saturate the wet pipe system with suitable plug which was also installed. One plug was burst and was replaced by the fire 100° sec.

After the first 30 sec. of the fire, the auxiliary and second plug fused after 2 min 15 sec. The water plug was

discharged over the fire. Further propagation tests seemed to substantiate the use of greater water output of the system over the system in the case of coupling fire and explosion, standard by a swirling spray of burning gasoline.

The test consisted of a fire of gasoline and gasoline with additives and a water system which had a water tank open air holding 3 ml. of gasoline.

Water was delivered to the fire 36 sec.

after it was lighted and the carbon was still burning.

After the first 30 sec. of the fire, the auxiliary and second plug fused after 2 min 15 sec.

Flame propagation

and a spray from below were also observed.

They were a feature not previously found in hangar sprinkler systems, and greatly increased the effectiveness of the system.

The water system, of course,

provides for burning gasoline, but effectively kept the flames from spreading.

An old plane which had also been tested in gasoline and placed adjacent to the burning gasoline and gasoline

and as far as the top surface of the cockpit over the burning gasoline in the cockpit did not catch fire, though the under surface was destroyed.

To Install Skids

CLEVELAND (UPI)—Air and ground crews of the Thompson-Houston Aircraft Corporation will be reengaged with skids this winter. R. C. "Tex" Marshall, vice-president and general manager announced

AVIATION November 26, 1939

Aero Branch Reports Air Transport Status

WASHINGTON (UPI)—An interesting analysis of the air transport situation in this country has been made by the Aviation Branch based on the reports from 27 of the 40 operators in the country. The report shows that some 1,200 aircraft of this year and the analysis has presented the theoretical set of figures for all the operators for that year which would like to the size of the national air transport market. The figures show only the total number of passengers and mail handled.

It is expected that the 1940 analysis will be released by the Lehigh Portland Cement Company to stimulate thought in this country as to the need of adequate air transport facilities for the future. The figures for 1940 will be revised and the comparison will be based on the early spring.

Pitmead Extends Line

LOS ANGELES (UPI)—Intensification of ship charter operations between San Francisco and San Simeon has been announced here by Thomas J. Maggio, general manager of Pitmead Lines, Los Angeles. The extension will add 112 to Pitmead's 2,000-ton fleet, which includes 100 ships between Los Angeles and Guatemala City with a daily passenger, mail and express run

Report 1,569 Airports Now in United States

WASHINGTON (UPI)—The latest report on the country's airports made by the Aerospace Branch states that 1,569 are now recognized and classified. Of these, 1,200 are commercial, 463 intermediate, 398 passenger, 80, auxiliary, 249. These airports are those marshalled and/or having more than 1000 passengers a day and there are about 4,000 other fields in the United States. About 1,020 airports have been proposed or are in process of construction.

The distribution of the 1,569 recognized airports by state is as follows: Alaska, 1; Arizona, 36; Arkansas, 15; California, 200; Colorado, 24; Connecticut, 11; Delaware, 2; District of Columbia, 5; Florida, 41; Georgia, 27; Idaho, 12; Illinois, 59; Indiana, 43; Iowa, 42; Kansas, 43; Kentucky, 15; Louisiana, 15; Maine, 1; Maryland, 24; Massachusetts, 43; Michigan, 20; Minnesota, 8; Missouri, 31; Montana, 22; Nebraska, 30; Nevada, 20; New Hampshire, 4; New Jersey, 20; New Mexico, 26; New York, 91; North Carolina, 36; North Dakota, 9; Ohio, 72; Oklahoma, 43; Oregon, 29; Pennsylvania, 43; Rhode Island, 10; South Carolina, 35; South Dakota, 26; Tennessee, 8; Texas, 191; Utah, 25; Vermont, 9; Virginia, 31; Washington, 20; West Virginia, 9; Wisconsin, 40; Wyoming, 20.

Crosswind Airlines Starts

SAN ANGELO (UPI)—Twice daily round trip passenger service between San Angelo, Fort Worth and Dallas was inaugurated Nov. 1 by the recently organized Crosswind Airlines, Inc. The line is to be operated by a consortium of West Texas oil operators. Stress Wings are being used. Carl Crosswind, San Angelo oil operator, is president and general manager of Crosswind Airlines. He has been a Los Angeles resident since 1934. For the past year P. D. Myers is office manager with headquarters in Fort Worth.

Mosquitos Plan Third Line

MOBILE (UPI)—A passenger line between Mobile and Pensacola, Fla., will be started by the Mosquitos Air Lines, Inc., to be headed by James E. Moore, according to E. M. Bruder, representative of the company. The company has been operating a line between Jackson, Miss., and Montgomery and another from Montgomery to Atlanta for some time.

G.A.Y. May Cut Passes

BOSTON (UPI)—Colonial Air Transport is considering the wisdom of discontinuing fares between Boston and New Haven, Conn., because the company has lost and is likely to continue losing money if they would consider using the air service. If the fares were only slightly over the general train fares



Fresno, Calif., Opens New Airport

CHAMBERS FIELD, the new international airport at Fresno, Calif., was dedicated yesterday. The field, which covers about 100 acres situated 2 1/2 mi. west of the main section of the city. The 8,000-foot runway runs into the prevailing winds, which are often from the northwest or northeast, to 3,000 ft. long and 100 ft. wide.

The lights are held by anchor lights placed flush with the ground and mounted in 40' concrete circles at 200' intervals along the center of the runway. The ends of the runway are three rows of anchor lights which mark the end of the objective runway, and are situated in the same manner

FOREIGN ACTIVITIES



Switzerland to Spend \$4,000,000 on Air Force

BERN (INTERNATIONAL)—Switzerland's military aviation corps is to be reorganized and almost entirely equipped with new planes by the end of next year, which has been authorized by the Military Department as the Federal Council for approval early in 1940 for an appropriation of \$4,000,000 (2,000,000 Swiss francs). One half of the sum is to be used for the purchase of 100 modern fighters, 60 observation planes, and 45 transport planes.

Engaged with Hispano engines, these planes are to be of the latest types, and are likely to bulk in the Swiss air force inventory. The models imported from abroad. The greater part of material to be used in their construction will be of Swiss origin. The remaining \$2,000,000 will be used for the purchase of material and equipment for the reorganization of present organizations.

In 1932, Switzerland's military aviation consisted of 24 observation planes and 54 pursuit planes. In addition, 80 planes were held in reserve, 40 of which were aircraft carriers. Few changes have taken place since that, as reorganization of the new project for combat reorganization which has been in progress and is now shortly to be adopted.

Switzerland's Planes

The Swiss government aircraft plan is that 100 modern fighters, 60 observation planes, and 45 transport planes under the supervision of their French supplier. The two basic designs are to be the D. 20 and the D. 25, both with 600-hp Hispano engines. The D. 19 is equipped with a 600-hp Hispano engine, wings with split flap and anti-shock strakes, and has a maximum speed of 250 mph at 15,000 ft. The D. 27 is smaller, wings with split 400-hp Hispano, and weighs 400 lb. Its Hispano engine developed a speed of 170 mph at 10,000 ft. It has tested flight these types are made of duralumin. The D. 20 and D. 25 planes are already sold to the Argentine government.

In addition Alfred Cazala, a Swiss engineer, manufactures a pursuit plane, the A. C. 1, which is to be delivered on the same date as the D. 20. It has a Hispano engine with a 600-hp Japanese engine, the A. C. 1 attains a speed of 181 mph per hour. It is also built of duralumin. Several of these have been shipped to the Argentine government, and it is to be what makes will be favored by the Swiss government. Both the A. C. 1 and the D. 20 are to be delivered to Argentina.

Restrict Crayon Activities

LONDON (INTERNATIONAL)—In view of the rapidly increasing airmen and air traffic in London's terminal airport, Crayton, and in order to prevent over crowding in the approach delays and landing in Britain, the Ministry of War has instructed the Military Department as the Federal Council for approval early in 1940 for an appropriation of \$4,000,000 (2,000,000 Swiss francs). One half of the sum is to be used for the purchase of 100 modern fighters, 60 observation planes, and 45 transport planes.

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Cazala Australian Monoplane Described

SINGAPORE (INTERNATIONAL)—Further details of the Cazala monoplane, high wing monoplane built in the country by the London Aircraft company for the Royal Australian Air Force. The aircraft has a span of 33 ft, a chord of 4 ft, and a maximum range of about 600 mi. Attention has been given to robust construction to make it suitable for operations in Australia. The aircraft is built of steel tubing with a fabric covering without welding. It is built in three sections, front end, cabin and rear end. The front and rear ends are quickly detachable. The wing is a single wing, built of spruce spars and fabric covering, with spruce top and bottom webs and plywood panels. The ribs have spruce cap strips with plywood panels. The rear section has a single spar, a type considered particularly strong. This is built up by two longitudinal beams weighing 600 lb per ft.

The wings are despatched from the factory, the struts being made by a local supplier. They are extremely strong, and the main struts are built with timber laminated plates. Semi-pneumatic upholstery is provided on the comfortable leather lounge chairs. Special precautions have been taken in designing engine mountings, in order to avoid resonance. The engine is fed by gravity from a tank in the rear of the fuselage. The tank holds 95 lb of fuel and there is a double skin incorporated with a special sound-dampening package to eliminate noise and prevent vibration.

A split air undercarriage provides a

Mail Being Carried To French Indo-China

PARIS (FRANCE)—By special arrangement between the French, Czech and English Air Ministers, an aeronautical agreement is to be concluded in Paris between Indo-China and return were rescheduled during October, November and December. Mail had been carried from Amsterdam to Bangkok, Siam, by L.F.L.M. aeroplanes, and vice versa, by the French Line Air-Asie or new ships. Some time ago it was arranged that each round trip takes well under a month.

Construction of this service during 1939, despite the difficulties of the present situation in Europe, has not yet been granted. It is hoped, however, that the necessary reciprocal agreement will be reached, and in the meantime the Air-Asie line will develop its services to countries such as China and India and elsewhere. Accordingly, it is proposed to establish a line from France to Japan by way of Syria, India, Indo-China and China, and experimental flights with this in mind are already well under way.

Frontal track of 35 ft. The wheels are mounted on shock absorbers, and the landing gear is strengthened with the rubber. The shock absorbing system is of the Oto-pneumatic type without any rubber reinforcement, and is designed with a maximum shock absorption of 54.8 per cent at a vertical velocity of 10 ft per second. The landing gear is built of two main units, one for each wheel, with longitudinal plates. Semi-pneumatic upholstery is provided on the comfortable leather lounge chairs. Special precautions have been taken in designing engine mountings, in order to avoid resonance. The engine is fed by gravity from a tank in the rear of the fuselage. The tank holds between 95 and 100 gallons and there is a dual skin incorporated with a special sound-dampening package to eliminate noise and prevent vibration.

A split air undercarriage provides a



The Cazala model designed and built in Australia.

Foreign News Briefs

Passenger and mail out of Crete has increased steadily for the past year and last April 4,000, as compared with 2,600 in October, 1938.

Our industry per cent regularly maintained during August on the Atlantic Copenhagen-Malmö has operated in S. E. Asia and the Far East for the eleven months to September 31, 1939, during that month 99.2 per cent.

Recommendations for the selection of airport sites and preparation of fields have recently been issued in a pamphlet published by the British Air Ministry.

Line III, a Blériot 28-passenger, 13-ton all-metal flying boat, has recently been tested by the British Royal Air Force.

Sir Alan Cobham will survey the proposed Copenhagen-Cairo route on the Giza Canal plain, which he recently visited England, and which has been purchased by Imperial Airways Ltd.

A modern picture of this has been prepared showing the effect of Hurricane Fifi on roads in what turned up again ten years.

A four-letter article in a recent issue of *The Aeroplane* indicates the rapid growth of interest in flying in England.

Chesterfield, Essex, may end up in be transformed into a flying field.

A series of flights at \$250 for 15 min is being offered at Tachikawa Field near Tokyo, Japan.

"Pilot assistant" developed in England by the Royal Air Force are to be having long flights on planes without stops from the pilot for distances up to 400 mi.

Membership in the English light plane club is said to have increased about 30 per cent since Jan. 1.

Capt. Stanislaus Czaja and his co-pilot, Janusz Bielawski arrived at Paris Nov. 21, completing the trip home from Manchuria where they had landed Sept. 20 at the conclusion of a 10-month stay. They took a one-way nonstop distance record. The Czech captain has not been interviewed yet. The Polish captain has been interviewed by a reporter, as has Mr. McGovern. Mr. Gaither, a controller for one of our major transoceanic routes, has been interviewed by a reporter for the *Evening Star*, as has Mr. McGovern. Mr. Gaither, a controller for one of our major transoceanic routes, has been interviewed by a reporter for the *Evening Star*, as has Mr. McGovern. The plane is intended for use in the case of an accident engine between 300 and 400 hp, such as Lorraine, Salmson, Siddeley, Wright. The present specification is as follows:

Span 36 ft, area 160 sq ft, height 11 ft 6 in, width 5 ft, total weight 2,000 lb, empty weight 1,300 lb, useful load 700 lb, fuel capacity 100 gal, oil capacity 10 gal, max. speed 170 mph, min. turn radius 1,000 ft, max. climb rate 1,000 ft/min., ceiling 15,000 ft, max. altitude 20,000 ft, range 1,000 miles, max. range 1,500 miles, max. range 1,700 miles, max. range 1,800 miles, max. range 2,000 miles, max. range 2,200 miles, max. range 2,400 miles, max. range 2,600 miles, max. range 2,800 miles, max. range 3,000 miles, max. range 3,200 miles, max. range 3,400 miles, max. range 3,600 miles, max. range 3,800 miles, max. range 4,000 miles, max. range 4,200 miles, max. range 4,400 miles, max. range 4,600 miles, max. range 4,800 miles, max. range 5,000 miles, max. range 5,200 miles, max. range 5,400 miles, max. range 5,600 miles, max. range 5,800 miles, max. range 6,000 miles, max. range 6,200 miles, max. range 6,400 miles, max. range 6,600 miles, max. range 6,800 miles, max. range 7,000 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WHAT OUR Readers Say

Personnel and Progress

To the Editor:
I wish to express a different viewpoint regarding your first editorial in the *Newspaper* and that entitled "Personnel." Not at all do I consider it appropriate for me to have never been a professor nor a civilian member of any of the Government departments. I do not believe the views expressed herein can be considered biased.

The rate of increase of personnel in my opinion will be more rapid if the best men are picked for the best jobs. It seems to me that when selection is based on merit alone and other considerations are secondary, the man who is most qualified under consideration, appears to stand the more rapid. It is of course very trying on the service of those responsible for the personnel of a university or Government department to always be selecting the best men for the industry due to its rapid growth and also confronted with the same problem. The law of supply and demand will continually force this dilemma.

There are many universities which have a single contact with an institution or Government department and after a year's service he may be offered the position of an executive position on the industry. If he is offered such a position and such that he is a needed man to head certain responsibilities would make, it would be only a temporary but a permanent loss to our country. This man to be forced to leave his university would be a definite loss to the field which is a service to him. The human element, even in a professor might lead him to his post with the same result of a general dissatisfaction of others less qualified and less able to assume the responsibilities and a general all around lowering of standards.

Let us go on to the English method of employment. Let us give the trained engineer his chance to work and let the engineers free him to climb as high on the ladder of progress as their ability warrants. This can only reasonably assist the industry but raises the morale and stimulates the results of all toward continued progress of American industry.

Karl H. Wahr,
Belleville, Ill.

The demands expressed in the third paragraph of Mr. White's letter is reminiscent as it real one, but it is not too much to expect that a man who has once decided to enter the service of the government or of an educational institution should remain there the reasonable length of time. A period

of two or three years was suggested in the editorial in which Mr. White refers. The educational value of work in a government department is in most cases enormous, and many young men enter the service for just this reason.

During the time they are there, however, with it they are learning the work and can be of little real value at entering it. They should expect to stay at least long enough to render service to the government, to the industry, and to themselves.

Very truly yours,
EARL DODDSON,
Santa Barbara, Calif.

Concerned Criticism

To the Editor:
In the October 28th issue of *Aviation* you have reprinted under the caption, "Solemn Demand from the Daily Press," the "Letter of the Air Ministry" as issued by the British War Office.

This editorial, while possibly representing the opinion of some of those outside the armament industry, is, in my view, in variance with the opinions of the majority of the armament firms. In my opinion, it is in disagreement with the letter itself. I speak as a professional transport pilot and as a brother of one of the men killed in the Boston disaster to which the British War Office refers.

My brother was pilot of that ship and I fully appreciate the concern expressed in that editorial in effect that those persons unfortunate enough to be killed during the performance of the National Service Act were not given sufficient or any measure contrary to "due diligence" as Charles and Colonial Air Transport¹ in their operation "of safe stages, safely powered thoroughly in accordance and always flown by competent men."

For example, consider the details of the accident in which my brother, his wife, and his mother were killed. He was flying a transport plane (No. 99) in the night, flying a "stage" also handled by the Department of Commerce, and owned by —. It was powered with a — motor and it was operating on the first stage by the name of "Boston" to Santa Barbara. No. 99, receiving Chester Field at Santa Monica.

The City of Santa Monica originally had 2,000 ft. square for an airfield but after there is never a wind blowing from the west or northwest, the city gave the rest to a golf course.

On my field there is never a wind from the west or northwest. The meteorites predict this. Why, therefore, a cross runway that could serve no purpose?

The Dept. had to meet the wide

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gap—empty when it does up those airport ratings—in California, where the Dept. has the right to close down any of the airports we have because the mountains and the sea, cause winds never cease—and for over second of the year. It would be a waste of time and effort and a waste of money except for the roads that bind us.

Chester Field, one of the most used fields in Southern California, cannot take out a D rating and yet it is a "stand good field."

In my opinion, the Department of Defense must be revised, as at least as complete as the rank conditions as we have not here an armistice boundaries.

EARL DODDSON,
Santa Barbara, Calif.

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crossing the finish line, the aircraft uses all the ship, leaving the operator with no means of landing passengers and subsequently causing the ship to strand up.

If modern airplanes, headed, angle power, thoroughly inspected and maintained, fly competently, then there is no reason why a trans-oceanic flight, there is something radically at fault with American transportation design and/or construction. In my opinion, the design should not be blamed, the operators, maintenance, and the last pilot, who places airplane problems at the design and construction.

It is my (as is often done) to blame the pilot, from the day he takes his first step into the aircraft, for the effects of chronic diseases who have gone through down to death in defective ships, and at the same time admire and glorify those companies whose responsible associates are the British, American, Canadian, French, and numerous other well-known defensive ships.²

I think that most of those engaged in the aeronautical profession regard the National Air Races as the epitome

expression of the "everyday progress of man was made" in aviation, and as such should be studied before they investigate the accidents.

However, when evidence of extravagance dooms one the daily news papers, those of us who earn living by the air are being put in a difficult position. We are not to be put or stand by while others receive lavish awards as "the open number status of the international."

Morris P. Devereux,

We are in full agreement with Mr. Devereux that the editorial reprinted was based in all applications. As has been made clear in editorial notes on previous occasions, the editorial intent is to bring out the daily press to the fact that the air race is not the only sport in which we have our live up to it. This column edited by Squadron Leader Bangs should really be entitled "Post War Aviators in the British Empire" and not "more generally established." The British have a wonderful tradition of sports, especially football, and I am sure that the Americans demand the annuals. As author for the airmen and as an important literary source for Americans, I hope that the editor will continue his good books and special sections of his periodicals which can stand the trouble and expense of reprinting. In this large, unified field of ours the material that must go into a year book is almost as great as the yearly allowance, but in the districts of Canada, Australia, India, Canada, and other airmen provinces, an English annual is a never-ending source of information and enjoyment. Who is not familiar with the "Aero Club of Canada's All the World's Aircraft"? They have correspondingly excellent volumes in almost all these professional and military fields. And this annual of Bangs' should be thought well of and used every year.

In general, the field divides into several main parts: Interlocking, Gearing and Solidarity. The *Air Services* of the British Regiments, Grid Aviation, Aerodrome Management, Flying Clubs, Civilian and Commercial Airplane Industry. Each subject treated separately for the British Isles, Canada, Australia, India, South Africa, New Zealand, etc., the arrangement is as follows:

Each article is written by some one especially well qualified for the particular subject.

Of special interest to Americans who have been able to study the services so closely as they must will be the very complex story of the light plane clubs and their complex system of government aid, and the functioning of the Royal Air Force as a repair service as an auxiliary to the Royal Canadian Air Force.

The author's services as an advisor to the Royal Canadian Air Force. The author on Aviation Institutes are also much to the point for us in view of the close connection between American and English insurance groups. The army and air force's aircraft, the supply, the accident records, finance proj-

ected, in greatest airline datum. And for this reason it may well become a most important and valuable addition to the technically informed among domestic engineers—DANIEL GERMAN.

British Year Book

The Air Aviator, or the *Squadron Leader*, 1939, Edited by Squadron Leader G. G. Morgan, Galt and Jackson, London.

New Volumes FOR THE SHELVES

Structural Design of Airplanes

SOMETHING NEW IN AIRPLANE DESIGN,
Planes by Prof. J. S. Peden. Ferry
1, Glazebrookshire, Torksey, Lincolnshire,
Lincolnshire, England, 1949, Paper
72d, 131 pages, 52 line drawings
in text.

It is presumed that very few of our readers will be prepared to deal with this Russian volume in the original. The author is presented as an engineering professor, and the book is a treatise on aircraft construction, particularly aircraft design, and the author's own researches in this field. The book is also based on the experience of aircraft designers, and the author's own knowledge of aircraft design.

It is assumed that the book is the first part of a general text on the aeroplane design of airplanes, particularly aircraft, and the author's work on the design of aircrafts is the first part of the book. The second part will consist of the design of airplane frames, including statically indeterminate types. The third part will treat of the design of aircrafts, and the fourth part will consist of general computations of the moments of inertia of the cross sections of various airplane elements and will also treat of the design of stiffeners, and other airplane parts.

In introducing the first part of his work, the author, who is a civil engineer

¹See also the *Editor*.

²See also the *Editor*.

ents, general uses, it has for the first time worked into our volume. The British are considerably more self-sufficient than we are in aircraft engines, and while they write on the subject our analysis is somewhat more clear and complete than those we may find elsewhere in the volume. Mr. Lowenthal was already hard at work developing a radical redesign which was shortly to become the much-needed backbone of the Navy. When he became a member of our board, the advanced and developmental stages of their whole aircraft engine program were worked out and discussed, the emphasis was not primarily on promotion.

In general, the emphasis in American aircraft engine design is on economy.

It seems that there is a tendency to believe that economy is a measure of performance as set up by C. G. Grey, editor of "The Aeroplane," in an article which we have had over here as a good to speak for us. The author of this article, however, makes a point which might well stand us in good stead in the future: "The aeroplane is not a toy, it is a machine which must be reliable. Safety must be a factor in all its parts. It must be safe to fly, it must be safe to land, it must be safe to take off, and it must be safe to stop." This is a good point, and one which we should not forget.

The first question is raised in Mr. Geddes' general article on aircraft engines:

"Is the same year (1931) a British-Jaguar engine was purchased by the United States Air Corps, and this no doubt has had something to do with the subsequent popularity of the British engine in the United States?" Now it is probably beyond dispute that certain Jaguar features were adopted with advantage in what we can call the middle dis-

velopment period of the Wright, but the particular Jaguer engine mentioned was used to McCook field for trials, and while it did not pass the test, the outcome is not clear.

Finally, the possible adoption of economy of these tests, due to variations of aerodynamic qualities with angle of attack, is largely considered by the present writer as being of secondary importance. While the variation may exist in theory, its great importance does not seem well demonstrated in actual development, the method or the rule responsible.

It is interesting to note that the results from the earlier tests of the relation between results in the laboratory and actual flight tests is highly doubtful, and that we should hope for rapid progress in this direction.

Mr. Geddes' consideration of the potentialities of the British engine, needs further study, and it is possible that present word cannot yet do justice to this interesting engine. We must, however, consider the question of whether the British engine is better suited for a two-place plane, with a light-revolved engine which develops 300 h.p., than for a single-place plane of 300 h.p. and a leading speed of about 100 m.p.h. when the corresponding American plane carries three people at the same speeds with a 30 h.p. waste compared with the British engine.

My personal opinion, however, is derived from the enormous value of the book, "No American who lays any claim to being informed on aviation can afford to be without it."

—DANIEL C. SAWYER

In the same year (1931) a British-Jaguar engine was purchased by the United States Air Corps, and this no doubt has had something to do with the subsequent popularity of the British engine in the United States." Now it is probably beyond dispute that certain Jaguar features were adopted with advantage in what we can call the middle dis-

velopment of Hispano Aviacion, and the principal military air force. Additional factors which should be noted are the Royal Canadian Air Force and the Royal Australian Air Force.

Graphic show an increase of slightly

more than 100 per cent in flying

in Argentina between the years 1930 and 1935. A similar claim is made

for South America, but the figures

indicate that the increase in Argentina may have been somewhat exaggerated previously.

Contrary to the policy of training their own pilots as practiced by the Argentine, French, and British, the United States, in other countries, principally the United States, for instruction of their men in the Navy which are generally regarded by government officials as being the best and most capable, particularly in administration.

In 1931 was founded the Naval

aviation school at Punta Arenas,

and in 1932 another was established at Puerto Montt.

The Argentine naval air service organization includes land and seaplane, amphibious, dirigible, less and captive balloons, Caudis for the training policy of the Navy is largely given to Argentina by the Italian Air Corps in 1932 which is the framework for the naval armament. The principal Naval air station is now located at Mar del Plata, renamed in the port of land protruding into the Atlantic between Buenos Aires and Bahia Blanca, and serving the entire Argentine coast. Naval flying equipment includes, Voigt, Curtiss and Kautzsch (American), Fairey, Vickers and Supermarine (British), Dornier (Germany) and Savoia-Marchetti.

In 1932 was born the Argentine's Civil Aviation Bureau, which functions under the jurisdiction of the Minister of War. Equipped at first to transport and to train flying clubs and individuals, the Bureau, which units—a number of the localities where there were—the regional agencies which followed were largely disbanded, and the civil service was established in 1934, which includes a majority of the Argentine aviation bureaux. Numbers of private aeroclubs followed their arrival and facilitated the new service, which was based on the best European traditions with state controlled systems through March 1936 to prove out that such units as were then formed were more "neutral" than those which were more "neutral" in the sense that the review is not repeated as to the reason for this suggestion, unless it is that the Argentine government wishes to reduce the power of the national carrier with the development of the Argentine air force.

Progress, other than the Civil Aviation Bureau, is directed by the War Department. The national budget was made in 1936 300,000 gold pesos (approximately a billion dollars) for the financing of the construction of Palermo, (a

Waco plane as representing the American beneficiaries of this program which shows for the purchase of the Waco plane, and the British and Spanish planes used by the military air forces.

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With the entry of Argentina, Germany, France, and Italy into the war, the United States virtually a subsidiary of the post office, unorganized service in August of 1938 to carry mail from Buenos Ayres to Toulouse via Africa and which was soon adopted an off-shore route to the Azores and the

area long operating mail and passenger planes through Uruguay and between Cordoba and Rio Cuarto (both of Cordoba), and the New York-Buenos

Aires route, which was originally

operated with the Graf Zeppelin of Avianca, KLM, Pan American and

Passenger Lines.

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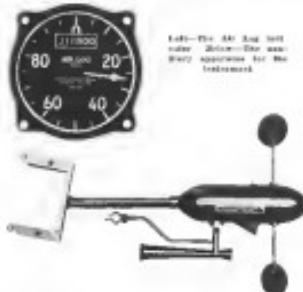
THE BUYER'S LOG BOOK



Pioneer Air Log

THE air log, an instrument used for showing the distance traveled by aircraft, is now being manufactured by the Pioneer Instrument Company, 754 Lexington Avenue, Brooklyn, New York. The pointer of the air log carries a small propeller which rotates as the airplane goes forward, once a rate attaining a value which measures vacuum, created by a small Vortex tube, to an indicator on the instrument board, thus adding one mile to the recorded distance.

The indicator has a band which makes available the data for each hundred miles, the hundreds being recorded by a wheel counter. By adding the indication



Left—The Air Log uses small Vortex tubes to measure the distance traveled.

of the counter to that of the band the distance traveled is read. The air log indicates to 990,000 feet and may also be calibrated to show nautical miles or kilometers. The indicator weighs 7 lb., the transmitter 1.1 lb. and the connecting tubing .06 lb. per ft.

Breuer Electric Paint Sprayer

THE Breuer Electric Mfg. Co., 851 Blackhawk St., Chicago, has recently placed on the market a new electric paint spray machine of the compressed type. It is intended for touch-up work, shading and light finishing and retouching jobs, as well as semi-production and production spraying work.

The new "Tornado" portable electric paint sprayer is built of aluminum casting, equipped with 1 hp General Electric Universal Motor, and develops a pressure of over 35 lb. The compressor unit weighs 7 lb. The gun weighs 2.5 lb.

The Tornado spray gun is equipped with two tips,

one slanted for fan spray and the other, narrow spray, and covering an area of 2 in. to 14 in. A handy adjusting screw controls the amount of paint to be used.

The Tornado, complete, is equipped with quart container, two tips, 20 in. of reinforced rubber covered cord, 8 in. of rubber web covered hose.

TRADE CATALOGS

AERONAUTICAL SUPPLIES. Catalog II for 1939 has just been issued by the Reliance Aircraft Corporation, Division of Universal Aviation Corporation, Lodi, N.J., Louis Flying Field, Angiers, Mass. This publication, which is known as the Ammunition Supply Catalog, has a complete selection of ammunition equipment as well as interesting tables and descriptive matter on certain standard associated products. A number of standard types of engines and a listing of parts for several of these engines who is incorporated or catalogued in the text. It is 106 pages in length.

BALL BEARINGS. The second edition of the ball bearing catalog published by the Gwynne Ball Bearing Division, Martin-Rockwell Corporation, Jamestown, N.Y., has recently been issued and contains 202 pages of information on the subject of ball bearings. In addition to a number of tables showing characteristics of the various types of ball bearings manufactured by this company, there are a number of catalog sections giving suggestions concerning construction, installation and use of these ball bearings. One section of the manual is devoted to engineering data relative to ball bearings and their application. Included in this section is detailed data required for calculating bearing loads, safety factors, running speeds, data regarding the selection of bearing-guides, and a glossary of ball bearing terms.

AERONAUTICAL SUPPLIES AND EQUIPMENT. A 200-page catalog of aeronautical supplies and equipment has recently been published by the Nichols Stanley Aeroplane Company, Inc., Marshall, Mo. This booklet, which is designated Catalog G, includes complete parts lists of the Curtiss OX-5 and OX-6, Hispano, Lebedoff, Wright Whirlwind and Vega engines, power plant equipment, aeronautical books, tools and materials also are included among the articles described. A number of helpful tables also are included in the catalog.

INSTRUMENTS. The instruments manufactured by the Aegean Watch Co., G. G. Berle Freedman, General Manager, have been listed in a 40-page catalog issued by the American Aegean Corporation, Houston, Texas, distributor of these instruments in America. Among the products featured in this catalog are: vectorial tubes, a combined clinometer and air-speed indicator having vernier and readjustable scale, a variometer to measure the speed of climb, a horizon clinching gyroscope and a number of recording instruments. Several types of compasses and a number of interesting and unusual combinations of instruments are included.

Gulfpride Oil



AMERICA'S FINEST AVIATION OIL



GULFPRIDE OILS

provide to the highest extent those desirable features necessary for satisfactory operation of Aviation Motors.

- 1. Oil economy—due to their extremely long life; resistance to oxidation and less volatility.
- 2. Lowered maintenance—because of proper lubricating qualities and very low carbon and gum forming characteristics.
- 3. Proper lubrication—a grade for each motor and condition of operation.
- 4. High quality—exhibit minimum change of body under extremes of temperature.

GULFPRIDE OILS are approved by leading Aviation Engine Builders.

Manufactured for Aviation Engine Lubrication
in five grades or body designations:

Gulfpride Oil 75 Gulfpride Oil 120

Gulfpride Oil 140 Gulfpride Oil 150

Gulfpride Oil 200

GULF REFINING COMPANY

General Offices: PITTSBURGH, PA.

District Offices

BOSTON

NEW YORK

PHILADELPHIA

LOUISVILLE

ATLANTA

NEW ORLEANS

BOSTON

Refineries

BAYPORT, N. Y.

PHILADELPHIA, PA.

PORT ARTHUR, TEX.



This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial worthiness.

Some serious thoughts from a frivolous discussion of advertising

You may now discern advertising around the bridge table. There the question is digested how to advertise most effectively.



One diamond (a publicity director) . . . "You can have your advertising job. Not for me. Advertising's getting too blamed unpopular with the public."

One spade (an industrial relations investigator) . . . "Ed, why don't you and I pack up our jobs, go out as crusaders and help recapture the public's faith in advertising?"

One no-trump (a McGraw-Hill advertising man) . . . "What are you sellers and the public slamming anyway, advertising principles or advertising practices?"

Pass (an Industrial Advertising manager) . . . "Keep it up, you aren't making me feel bad. Most of that present-day criticism of advertising comes from persons who never see Industrial Advertising and of course know nothing about real advertising. If there is one place where advertising must be free of hunk, exaggeration and spurious testimonials it is in the industrial field where it is read by engineering minds first and emotional minds last."

THE news, editorial and advertising pages of the advertising journals reflect the serious attention being given the subject discussed more or less lightly above.

Industrial Advertising suffers, of course, with all advertising when advertising is under fire. Yet, by and large, Industrial Advertising copy has followed the sound principles of appeal described on pages 51 to 68 of the McGraw-Hill study, *Industrial Marketing at Work*. Does not the viewpoint of "Pass" suggest that earnest minded advertising men can help all advertising by studying Industrial Advertising . . . its use of restraint, facts, tests, logic and bona fide testimonials as opposed to "blue sky"?

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Denver Philadelphia St. Louis
Greenville San Francisco Boston Boston London

Learn to Fly ~



Where Sunshine Spends the Winter

Learn to Fly without the hazard of icy blasts and biting cold, of snow and sleet. Train at AIRTECH where sunshine spends the winter.

In addition to the main school at San Diego, AIRTECH conducts a winter branch, from November 15 to March 15, at Palm Springs, California. At this foremost winter resort, AIRTECH students learn to fly in America's most perfect winter climate.

At Palm Springs and San Diego, AIRTECH operates Schools of Aviation under Department of Commerce approval. Students now enrolling for this recognized training will be equipped to take their places in aviation when spring brings renewed activity on Eastern Airports.

Write now for "Flight Facts from Lindbergh Field"—and learn aviation where sunshine spends the winter.

Airtech School of Aviation

Department of Commerce Approved
Transport Ground and Flying School

Lindbergh Field



San Diego, California

This is one of a series of advertisements devoted especially to advertising men to the fact it is more important advertising more profitably to buyer and seller. It is printed at three times its normal cost to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial worth.

Of course, this doesn't happen every day

Recently in Erie, Pa., a McGraw-Hill circulation man visited a plant to get subscriptions and got the surprise of his life. The story may be interesting to those advertising men, who, in selecting advertising mediums, consider not only reader interest but how circulation is built.

Frankly, this Erie plant was not covered as a unit^{*} by certain McGraw-Hill publications. The circulation man was there to find out why. In keeping with McGraw-Hill policy he called at the front office, learned the plant set-up and obtained permission to interview key men.

When, finally, he reported back to the front office the surprise came. Unknown to him an executive had watched him work. This executive greeted him somewhat like this:

"S

*Our coverage is the sum of McGraw-Hill publications. It does not cover the entire field. It is up to each department to plan with the right publications.
So this is the way McGraw-Hill builds circulation! It interests me because you see we are advertising in your *Engineering News-Record*. We are now going after some mining business and your demonstration here convinces me that your *Coal Age* is a good place for us to advertise."

McGraw-Hill circulation headquarters in New York will gladly explain its principles and practices of circulation building to those who are interested.

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Denver Philadelphia St. Louis
Greenwich San Francisco Boston London

Modern aircraft design, mechanics and maintenance—in one complete handbook!



Chapter Headings

- 1. Simple Airplane Theory
- 2. Types of Airplanes
- 3. Buying and Serving the Plane
- 4. The Airplane Engine
- 5. Trouble Shooting for Airplane Engines
- 6. The Propeller
- 7. Engine and Pilot Accessories
- 8. Aircraft Instruments
- 9. Airplane Construction
- 10. Materials for Aircraft Construction
- 11. S.A.E. Standards
- 12. Airships, or Dirigible Balloons
- 13. Construction of Airports
- 14. Air Commerce Regulations
- 15. Nomenclature for Aeronautics

Profusely illustrated with diagrams and photographs

No matter whether your job is in the cockpit, the hangar, the factory or the airport, this authoritative aviation guide will give you instantly available information. It is a standard source of reference for the experienced man and a thorough medium of training for the student.

Fourth Edition

AIRCRAFT HANDBOOK

By FRED H. COLVIN, Editor, American Markets and HENRY P. COLVIN, Vice-President, McGraw-Hill Company
400 pages, \$6.75, 350 illustrations, double binding.
32 lbs. paper

THE AIRCRAFT HANDBOOK, by reason of its latest complete revision and enlargement, stands a universal need in the aviation world.

To the designer and factory man it gives sound and accurate data on strength of materials, construction methods, rigging, wing shapes, etc.; to the mechanic and repairer the knowledge and tools needed for the elimination of engine accessories, trouble shooting, and servicing. To the student or aeronaut pilot it gives the air commerce regulations, requirements for various types of licenses, equipment needed, and the latest methods of navigation through illustrations such as drift arrows, earth indicator compasses, etc. To everyone interested in aviation this book offers a complete nomenclature of terms used together with a concise and comprehensive explanation of aircraft control and management.

See this book for 10 days FREE

Put the New Aircraft Handbook in to anyone writing for 10 days free examination. If you like it, buy it. The McGraw-Hill Company, Publishers, 330 West 42nd Street, New York, N.Y.

Mail the coupon TODAY

MC GRAW-HILL FREE EXAMINATION COUPON

McGraw-Hill Book Co., Inc., 330 West 42nd Street, New York.

Please send me for my 10 days examination—Postage paid and Fully v. A.M. for the **THE AIRCRAFT HANDBOOK**—Volume \$6.75, postage 32c, a copy to be put in the book or return it unreadable within 10 days at no charge.

Name _____

Address _____

Date sent _____

Official Position _____

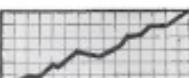
Name of Company _____

Please note we are entitled to extend our examination in U. S. and Foreign 42-247-12



What is wrong with this star salesman?

With the R.R.C. Company he was a photon and success.



He went with the XYZ Game Corporation and was a dismal failure.



The difference is not in the salesman nor in the product but in the nature of the Industrial Advertising backing. Every industrial

salesman cannot be a star, but the best that is in him can be developed if the advertising policy and plan are based on achieving Recognition.

How to build this recognition in ten simple steps is graphically explained in the book, "Industrial Marketing at Work". A copy will be delivered by the nearest McGraw-Hill office to any executive responsible for sales or advertising to industry.

McGRAW-HILL PUBLICATIONS

New York
Philadelphia

Chicago
Garrison

Cleveland
Des Moines

Detroit
Baltimore

London

Harold G. Stassen
Instructor in Marketing at the Spartan
School who will give you free
for personal interview



Harold G. Stassen,
Instructor in Marketing at the Spartan
School who will give you free
for personal interview



A Spartan Industrial plane, powered with a Wright Whirlwind motor, fully equipped with instruments and radios.



A class in precision drawing. Participants are shown during all cross-training and maintenance flying.



A view of the welding school. All flying and maintenance students receive welding instruction.



One of the first planes delivered by Southwest Air Field Express between Tulsa and major cities west of them.

SPARTAN TEACHES BY GOVERNMENT STANDARDS AND MILITARY METHODS

At the Spartan School of Aeronautics, military methods prevail to the extent that every student's daily activity is a matter of precise schedules. There is no waste of time, no guesswork, no uncertainty. Training planes are always ready for flight at the appointed hours and students report promptly because they appreciate the effort to give them more than a dollar's worth of instruction for each dollar spent.

Pride . . . and the Spartan Honor System

Spartan students are proud of their school and its business-like methods of operation. Students realize that the Spartan staff is constantly making an earnest effort to give them the best flight and ground school training available and they respect the honor system of discipline which requires neither rules nor regulations. The result is excellent co-operation between students and the school staff.

SPARTAN ADVANTAGES

Spartan offers ten outstanding advantages to the student-pilot: 1-The School is licensed by the U.S. Department of Commerce as both Transport Flying and ground school; 2-Air Flight and ground instruction are government-licensed; 3-A liberal extended tuition payment plan is available to students; 4-Student dormitories and cots provide excellent living conditions of reasonable cost; 5-Air transportation to Tulsa from Subway terminals in field planes provided without charge to new students; 6-All open cockpit and cabin training planes powered with enclosed motors including Wright Whirlwind; 7-A scientifically arranged ground course including instruction in theoretical, technical and business subjects; 8-Unusual cross-country flying privileges; 9-Reasonable tuition charges in all courses; 10-All ideal climate for year-round flying.

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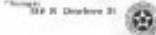
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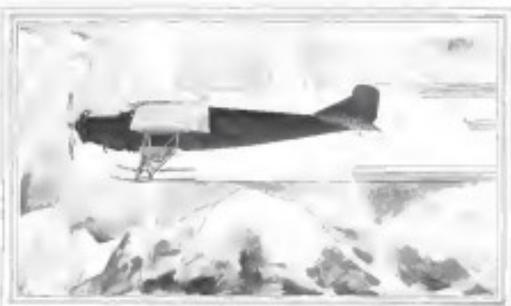
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